

The MARINE CORPS GAZETTE

Colonel Elisha Theall, U. S. Marine Corps, Editor.

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PROVISIONAL MACHINE-GUN DRILL AND NOTES ON THEIR TACTICAL HANDLING, FOR 24TH COMPANY

CAPTAIN MARION B. HUMPHREY, COMMANDING 24TH COMPANY

1. **T**HE machine-gun section consists of two Benét-Mercie machine guns and the following personnel:
One lieutenant, machine-gun commander.
One gunnery sergeant, chief of section, and second in command.
One corporal, leader gun crew No. 1.
One corporal, leader gun crew No. 2.
One private, orderly to machine-gun commander.
Two privates, scouts, range finders, and signalmen.
One lieutenant, one gunnery sergeant, two corporals, eleven privates; total, fifteen.

2. The general duties of the personnel are as follows: The machine-gun commander is responsible to the company commander for the tactical handling of the section and for its general efficiency both as to personnel and matériel.

3. The junior officer of the company will be designated as machine-gun officer; in the event it is impracticable to detail an officer for this duty, then the company gunnery sergeant should be detailed.

4. Prior to an engagement the company commander will make known to the machine-gun commander the situation in detail, the ends sought, the company objective, and the manner in which he will conduct the company in order to secure the same. He will in a general way designate to the machine-gun commander the initial machine-gun positions and the manner in which the section may best cooperate to secure the desired results, being careful, however, not to restrict the machine-gun commander to a set method of action,

thereby hampering the section in later unforeseen phases of the engagement, and which would also encroach upon the prerogatives of the machine-gun commander.

5. After receiving the above information the machine-gun commander will assemble the section and explain to all minutely the situation, the objective and the plan of action for the section which he deems will best insure the success of the company commander's plans.

6. He will select, as far as practicable in advance, successive gun positions for the section, send out scouts, estimate and plot ranges, arrange for the future supply of ammunition, and in general be thoroughly prepared to intelligently and energetically carry out the task allotted the section when the time arrives.

7. The chief of section's duties in general are as those of the first sergeant of a company. He is also responsible for the efficiency of the matériel at all times.

8. He will usually accompany the machine-gun commander, but may be posted wherever his services may best be utilized and he will be prepared to take command of the section should the machine-gun commander become a casualty.

9. The section corporals will act as gun-crew leaders, they direct, control the fire and movements of their respective guns in accordance with orders from the machine-gun commander.

10. The orderly will accompany the machine-gun commander. He must be a qualified signalman.

11. The scouts will be specially selected machine-gun men and qualified signalmen with courage and initiative, and proficient in the use of the type EE, field glass, Barr & Stroud range finder, estimating distances by eye, and also capable of making fair landscape maps when necessary and plotting ranges to objectives of the same.

12. The members of the gun crews must be thoroughly drilled in the duties pertaining to all members so that in the event of casualties they can instantly fill in and maintain the fire action.

13. All members must be proficient in sending and receiving by semaphore and estimating distances by eye.

14. The duties of each member of the gun crews is laid down as follows:

15. *No. 1 gunner:*

Carries gun into action.

Sets sights.

Operates gun.

Calls to No. 4, for spare barrel as necessary.

Repeats range and target.

No. 2 gunner:

Carries two boxes of ammunition.

On going into battery, places ammunition boxes hinges to the front, 2 feet to the right of and in line with the sight leaf.

Inserts clip in magazine, standing by to replace with full clip instantly when first clip is exhausted.

Calls "Ammunition" to No. 4 when approximately half of the second box of ammunition has been expended.

Assists in extraction of jams.

No. 3 gunner:

Carries two boxes of ammunition.

On going into battery places boxes ten paces in rear and three paces to the right of position selected for the gun, at post of No. 4.

Takes tool kit from No. 4.

Takes post one pace to the left of No. 1.

Assists No. 1 in setting up gun, spreads tripod legs, opens tool kit and places same near at hand.

Calls "Ready, No. 1 or 2," to gun leader when gun is ready to fire.

Lies prone, holds down tripod legs during firing.

Assists in the extraction of jams and mounting spare barrel.

Places empty clips in haversack as used.

Takes post as gunner in case same becomes a casualty.

No. 4 gunner:

Carries one box of ammunition in right hand, tool kit in left hand and spare barrel slung diagonally across back.

On going into battery takes post ten paces in rear of and three paces to the right of position selected for gun.

Places ammunition box along with boxes deposited by No. 3 with their lengths perpendicular to the front and spare barrel muzzle to the front to right of boxes.

Carries forward ammunition and spare barrel as called for.

Watches for signals from machine-gun commander and scouts.

16. Gun crew leaders take post in rear of their respective gun or where their services may be needed most.

17. They will watch for signals and orders and transmit same instantly.

18. When No. 3 of their respective gun crews call "ready," leaders will elevate right hand vertically above the head as a signal to the machine-gun commander, who will acknowledge same.

19. On going into battery gun crews will habitually assume the prone position and make all use of the cover available. Members not actively engaged will preserve immobility as far as practicable.

20. The personnel will be armed and equipped as follows:

	Pistol	M. C. Bolo	EE glasses	S. flags	In tools
Machine gun comd..	1	1	1	..	1 wire nippers
Chief of section.....	1	1	1	..	1 spade
Gun crew leaders.....	1	1	1	2	Nippers and pick
Scouts.....	1	1	1	2	Nippers and spade
Orderly.....	1	1	..	2	Nippers and spade
Nos. 2.....	1	1	1 spade
Nos. 3.....	1	1	Nippers and pick.
Nos. 4.....	1	1	

22. Semaphore flags should be made about one-fourth regulation size.

23. NORMAL FORMATIONS

Command "SECTION FALL IN"; at the last word of command the guns are placed on line by Nos. 1 of each gun crew, Nos. 2 on line with and ten paces to the left of gun No. 1.

Nos. 2 place ammunition boxes on line with and two paces to the right of the sight leaf of their respective guns.

Nos. 3 place ammunition boxes three paces in rear of guns and tool kits one pace to the left of sight leaves.

Nos. 4 place ammunition boxes three paces in rear of guns, spare barrel, with muzzle to the front, to right of ammunition boxes.

24. On completion of the above the section falls in, in double rank

from right to left on the chief of section, who takes post ten paces in rear of gun No. 1, gun crew leaders taking post on the left flank, each in line with his respective crew.

25. Gun crew No. 2 forms the front rank and gun crew No. 1 the rear rank.

26. The chief of section commands "Count off," "Right dress," "Front," whereupon all numbers and leaders count off from right to left as ONE, TWO, THREE, FOUR, etc., dress smartly to the right and assume the front at command.

27. Command "IN BATTERY, MARCH," gun crew No. 2 executes left turn in double time, each member taking post and performing the duties as previously explained for the gun crews.

28. Gun crew No. 1 executes "Right by files" in double time, conforming to the movements as above indicated for gun crew No. 2.

29. To march the section to the front, "COMMAND, FORWARD MARCH." At the command "Forward," all members secure their part of the matériel and rise, at the command "March," given when the section is ready to move forward, each member picks up his part of the matériel and marches to the front in column of files, No. 1's, leading, followed by Nos. 2, 3, 4 and gun crew leader at three-pace intervals.

30. The chief of section marches opposite to and on the right of No. 1, conducting the march when in command.

31. The section will usually be marched in line of gun crews in column of files at three-pace intervals; intervals may be increased or diminished by order.

32. The section may be deployed as skirmishers. "COMMAND, AS SKIRMISHERS, MARCH." Nos. 1, 2, 3 and 4, of each crew execute "Left front into line" and maintain the interval of three paces.

33. The normal interval between files in column and skirmishers in line is three paces; intervals may be increased or decreased at will by the command so many paces "Open" or so many paces "Close."

34. The normal interval between gun crews is ten paces, which may be increased or diminished by the following commands: "ON NO. 1 GUN FIFTEEN PACES EXTEND," or "ON NO. 1 GUN TWO PACES CLOSE"; the extension or closing may be made on either gun crew.

35. The section may be marched to the front, flanks and rear by

the same commands and in a similar manner as the company.

36. The following conventional signals should be used and thoroughly understood by all members of the section.

37. By semaphore when spotting must be done from a distance from the gun's position.

P = plus. Fire observed 50 yards or more beyond the target.

M = minus. Fire observed 50 yards or more short of the target.

R = right. Fire observed to right of target.

L = left. Fire observed to left of the target.

C = center. Fire direction correct.

U = unobserved.

Up = up so many yards.

D = down so many yards.

38. After gun leaders have signalled that guns are ready to fire the machine-gun commander will make signal "COMMENCE FIRING" by raising and lowering right hand above the head several times. To cease fire the conventional infantry signal will be used for the same.

39. To signal gun out of action gun leaders will extend right arm, point hand toward machine-gun commander, and describe small circles.

40. Machine guns are primarily weapons of opportunity and the best results will be obtained when their fire is in the nature of surprise. They may be used only for short periods of time as their fire will immediately draw a heavy concentrated rifle fire and artillery fire; therefore they must be prepared to deliver an accurate and rapid fire, their limit of speed being obtained during the firing interval.

41. Positions which offer the best field of fire and excellent concealment should be selected, great stress must be laid on the subject of perfect concealment for without the same the object of fire surprise will be defeated.

42. Concealment may be divided into: (1) cover from fire, (2) cover from view, cover from fire must be of sufficient strength to secure the guns against rifle fire and shrapnel fire, and also fulfil the conditions necessary to give cover from view.

43. Alternating firing positions will be selected with view to (1) the field of fire offered; (2) cover of position; (3) cover offered in advancing to or retiring from position to position.

44. Owing to the small frontage occupied by a machine gun,

good cover will generally be readily found. The average frontage of a gun will be 2 yards, from which it can deliver a fire equal in volume to that of 30 or 40 rifles and at the same time offering an exceedingly small target to the enemy. It must be remembered, however, that machine guns cannot effectively reply to a great volume of concentrated rifle fire or artillery fire.

45. The Germans have placed the fire of one machine gun equal to that of from 50 to 120 rifles.

46. Due to the highly concentrated fire of a machine gun which makes the shot group about twice as small as that of a rifle firing the same number of rounds at the same target, it can readily be seen how very important it is to make a correct estimate of the range, if we expect to obtain good results at the longer ranges where the danger space decreases rapidly with each increase in range.

47. The beaten or effective zone is that area which contains 75 per cent of the shots fired. The following table gives approximately the depth of the effective zone at different ranges and shows further, the importance in estimating ranges correctly in order that the target will be within the effective zone.

<i>Range in yards.</i>	<i>Depth of effective zone in yards.</i>
500	225
600	200
700	200
800	175
1,000	140
1,200	115
1,500	75

48. Machine guns are of great assistance in the attack, in helping the infantry to gain and maintain the superiority of fire. Light guns may advance with the firing line while the heavier types will be better used in covering fire either from the rear of the lines or on the flanks.

49. Gun positions on the flanks are usually the best, as they can deliver an enfilading fire which is most destructive.

50. After a position has been gained by the infantry, the machine-gun section must reach the position as quickly as possible and open fire on the retreating enemy. Their fire will give time for their own infantry to reform and secure the position, and aid the infantry

should the enemy deliver a counter-attack. Guns should change position as seldom as possible after once going into action if their position has not been discovered by the enemy.

51. Machine guns are valuable in the defense of bridges, defiles, roads, and in covering a retiring body of troops.

52. In a defensive line guns should cover all important approaches, alternate positions must be selected and cover for the same provided previous to their occupation. Ranges will be determined to all important objectives.

53. In the defense of towns and villages, first floors and basement windows of houses will usually offer good machine-gun positions if well concealed. The British cited instances where the German machine guns took up positions on first floors of farm houses and allowed the British lines to pass beyond them whereupon they opened a most destructive fire from the British rear. In defensive lines the Germans placed their guns many times in rear of their front line trenches, covering gaps in the wire entanglement which they purposely left open to lure the British through.

54. A cross fire should be delivered instead of a purely frontal fire, as the direction of the former is not easily determined by the enemy and lessens the chance of discovering the gun positions.

55. FIRE

Machine guns should only open fire: (1) to facilitate the movements of infantry, (2) to deny or delay movement of the enemy, (3) against favorable targets.

Fire should not be opened unless there is a good chance of obtaining the desired results; otherwise it is only a waste of ammunition and disclosure of the gun position which renders future service in that position of no value.

56. Fire should not be opened at targets over 1,200 yards in range unless they present an exceptionally favorable target, such as large bodies of troops, cavalry or field artillery and supply trains on the march. Machine guns are extremely effective at all ranges under 1,200 yards.

57. Machine guns will usually fire on the target which is most dangerous to its own infantry. Here it must be remembered that machine guns cannot reply to artillery fire effectively; to do so usually means an annihilation.

METHODS OF FIRE

- 58. Ranging fire.
Rapid fire.
Sweeping fire.
Sweeping rapid.

59. In ranging, fire strings of from 10 to 20 rounds will be fired by the right gun in order to determine the sight leaf setting to be used.

60. Ranging fire will never be used when surprise is of importance.

61. Rapid fire is used when a great volume of fire is required, whole clips of 30 rounds will be fired, between clips the gunner will check the sight leaf for elevation.

- 1. It will be used for surprise fire habitually.
- 2. Against moving artillery, cavalry, and infantry.
- 3. It may be used with combined sights.

62. Sweeping fire will be used against linear targets, strings of approximately 6 rounds will be fired, the gunner will move the butt of the gun one-fourth the distance of its lateral train after each string of 6 rounds; thus a clip of 30 rounds will be expended when the gun has been traversed its limit from right to left.

63. If sweeping fire is used with two guns in action the right gun will sweep from right to left on the designated target, returning at the end of the traverse to the right edge of the target and resuming the fire as above indicated.

The left gun will sweep from left to right on the designated target in the same manner as explained for the right gun. In this manner the entire target is thoroughly covered and a cross fire obtained which makes it exceedingly hard for the enemy to determine the gun positions.

64. Sweeping rapid fire will be used against dense targets. Whole clips of 30 rounds will be fired while the butt is traversed its limit from right to left without stop, new clip inserted and butt traversed from left to right and so on.

65. In selecting gun positions for the offensive or the defensive care must be exercised to have sufficient interval between gun positions in order that a shell bursting on or near one gun will not also put the other gun out of action.

66. When targets of depth present themselves it is considered advisable to use sweeping fire with combined sights set at a difference

of 100 yards for ranges from 800 to 1,200 yards, and a difference of 50 yards for ranges above 1,200 yards.

67. In using combined sights the range first announced will be that taken by the right gun and the range given next will be applied to the left gun.

68. To designate that combined sights will be used it is only necessary when announcing the range to order "Range 800-900," etc., whereon gun leaders will instruct their respective gun crews accordingly.

PROFICIENCY TESTS

69. In order that all members of the gun crews will be thoroughly familiar with all operations of the guns they will be required to become expert in the following tests and a record of their proficiency in, and time for each test, will be recorded.

1. To dis-assemble gun...	Prof.	Time.
2. Name and explain action of all parts.	Prof.	No Time.
3. Assemble gun.....	Prof.	Time.
4. Mount gun for action from shoulder....	Prof.	Time.
5. To load from open box.....	Prof.	Time.
6. To unload.....	Prof.	Time.
7. Set sights and lay on target.....	Prof.	Time.
8. Change barrel.....	Prof.	Time.
9. Resize and refill clip.....	Prof.	Time.
10. Rectify stoppages.....	Prof.	Time.

FIRING COURSES

70. The following courses will be fired by all members of machine-gun crews, and those men obtaining the necessary score for qualification at each range will be designated as machine gunner, first class, and machine gunner, second class, in company orders. They will be issued with gun pointer insignias and wear the same on sleeve of left forearm midway between the wrist and elbow.

White insignia.....first class
Blue insignia.....second class

71. The ammunition allowance for instruction practice is unlimited.

72. Target "D" will be used at all ranges.

CLASSES OF FIRE

73. Grouping fire.
Sweeping fire.

Grouping fire

Range 200 yds.....	2 S. S. 15 rapid for record.
Range 400 yds.....	2 S. S. 15 rapid for record.
Range 600 yds.....	2 S. S. 15 rapid for record.
Possible score at each range.....	75
Qualification score for gunner, first class.....	70
Qualification score for gunner, second class.....	65

Sweeping fire

Range 200 yds.....	5 S. S. two strings of 30 rapid for record.
Range 400 yds.....	5 S. S. two strings of 30 rapid for record.
Range 600 yds.....	5 S. S. two strings of 30 rapid for record.

Procedure.—Five targets will be run up and one sighting shot fired on each target from right to left, which necessitates the butt being traversed from its extreme left position to its extreme right position, moving the butt approximately one-fourth the distance of its traverse for each shot. The 60 shots for record will be fired in two clips of 30 rounds each, one clip firing from right to left and the other clip firing from left to right.

The gunner will endeavor to fire 6 rounds on each target, thus using a complete clip on each traverse; however the total score for all targets will be counted regardless of the number of hits more or less than 6 on each target, except that all targets must be hit at least once for the score to count.

Possible score for each sweep.....	150
Qualification score for gunner, first class.....	110
Qualification score for gunner, second class.....	100

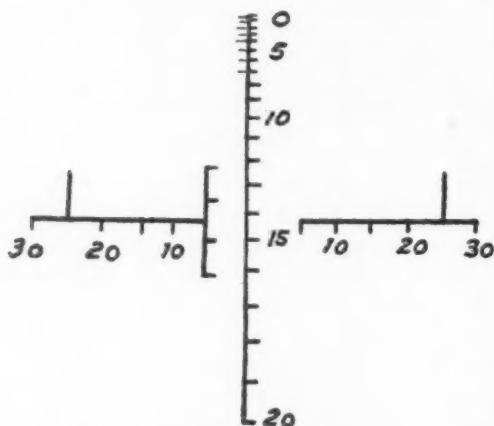
74. Time of all strings fired and the dimensions of shot groups will be measured recorded for information.

75. The firing at 200 yards on August 8 and 9, proved the value of having No. 3 hold down the tripod legs during the firing which finally reduced the average shot groups for 15 shots to 8 by 11 inches. The greatest difficulty encountered was the inability of the gunners to hold the gun on throughout the string, due mostly to the instability

of the gun mounts. With an expenditure of over 2,800 rounds of ammunition only four second class gunners were qualified.

FIELD GLASSES

76. In order that targets may be quickly picked up, ranges estimated, fire observed and controlled, all company officers and noncommissioned officers should be issued with excellent field glasses. Reports covering the early stages of the present world war show that the British were seriously handicapped by the shortage of such glasses in the infantry. In the German Army, all officers and noncommissioned officers were issued with exceptionally good glasses before the outbreak of war which, from reports, proved their value in many instances. The Marine Corps is now issuing an excellent type of field glass, manufactured for the Signal Corps of the Army—the type “EE” glass of 6 power, which contains a horizontal scale of mils and a vertical scale which is a reproduction of the rear sight leaf of the Springfield rifle. The contained scales are illustrated below.



77. It would be of great assistance to all officers if the Quartermaster Department inclosed with each pair of type “EE” glasses a printed form giving the formula to be used in connection with the contained scales. The few officers I have seen issued with this type of glass did not know how the scales might be used.

The following information and formulae for use with the type “EE” were taken from “Notes on Instruments” which appeared in

a copy of the *Infantry Journal* in the early part of 1917, and were prepared by the School of Musketry, U. S. Army.

SCALES AND THEIR USE

78. The horizontal scale, which is divided into 60 mils, is used for estimating ranges, etc. The mil, the angle whose tangent is .001, is the angular unit used in this course.

79. For the computations required in the control of fire, the system of angular measurements, in terms of degrees, minutes and seconds, would be very cumbersome. A much more satisfactory unit is the mil. This is the angle whose tangent is .001. Its value in the conventional angular measure is $3' 22.5''$, which is arrived at by dividing the circumference of a circle into 6,400 parts. This is a sufficiently close approximation to the true mil and greatly simplifies the manufacture of the scales of such instruments as the battery commander's telescope and panoramic sight.

The mil is used for target and sector designation and in estimating ranges and occupied fronts in terms of yards or men. An object one yard long at a distance of one thousand yards subtends an angle of one mil. The mental calculation of problems involving the solution of triangle is easy if the following equations are kept in mind:

$$R = \frac{W \times 1000}{M} \quad (1)$$

$$W = \frac{R \times M}{1000} \quad (2)$$

$$M = \frac{W \times 1000}{R} \quad (3)$$

Where R equals range in yards, W equals width or height in yards, M equals number of mils subtended by W .

81. The following examples of the use of these formulae indicate their practical use:

Example 1 (estimate of range):

A certain tree is estimated to be 15 yards high. It covers an angle of 25 mils. It is therefore 600 yards away, for

$$R = \frac{W \times 1000}{M} = \frac{15 \text{ yards} \times 1000}{25} = \frac{15000}{25} = 600 \text{ yards.}$$

82. The telegraph poles seen on a distant railroad running at right angles to our line of sight are known (from previous measurements) to be 44 yards apart; the distance between two adjacent poles is observed to be 40 mils; the range to the railroad is therefore 1,100 yards, for:

$$R = \frac{W \times 1000}{M} = \frac{44 \text{ yards} \times 1000}{40} = 1,100 \text{ yards.}$$

83. *Example 2 (estimation of fronts):*

A line of skirmishers at about one yard per man of front covers 40 mils of the scale; the range is known to be 800 yards; the number of men is therefore 32, for:

$$W = \frac{R \times M}{1000} = \frac{800 \text{ yards} \times 40}{1000} = \frac{32000}{1000} = 32 \text{ yards, or men.}$$

84. A column of infantry in fours is seen by a patrol at 1,200 yards range. It is moving across his front and covers 120 mils from head to rear of the column. How many men are in the column?

$$W = \frac{R \times M}{1000} = \frac{1200 \text{ yards} \times 120}{1000} = \frac{144000}{1000} = 144 \text{ yards.}$$

At two men per yard, the column contained 288 men.

85. *Example 3 (determination of mils in distributing of fire):*

A hostile force known to consist of about 100 men is deployed in a position 1,000 yards away but so concealed that its flanks cannot be seen or determined definitely. The company commander decided to cover a front of 200 yards with his fire, 100 yards on each side of the visible group of heads in the hostile line. How many mils should be covered?

$$M = \frac{W \times 1000}{R} = \frac{200 \times 1000}{900} = 200 \text{ mils.}$$

A machine-gun platoon known to comprise two guns is concealed at a range of 900 yards, with one of its guns visible through glasses. The company commander decides to cover a front of 50 yards on each side of the visible gun. How many mils should be covered?

$$M = \frac{W \times 1000}{R} = \frac{100 \times 1000}{900} = 111 \text{ mils.}$$

Where it is possible to measure off a distance D directly toward or away from any object which subtends a fairly large angle (50 to 300 mils) we may use a formula derived from formula (1) and

which does not contain W ; in other words, in this case the width of the object or the height does not have to be known. When the distance is measured towards the object, the formula is:

$$R = \frac{D \text{ times } 2d \text{ mil measurement}}{2d \text{ mil measurement, minus } 1st \text{ mil measurement}}$$

When this distance is measured away from the object, the formula is:

$$R = \frac{D \text{ times } 2d \text{ mil measurement}}{1st \text{ mil measurement, minus } 2d \text{ mil measurement}}$$

86. *Example 4:*

From this point a hostile trench measures 150 mils. A scout goes forward 330 paces (300 yards) and finds that the trench covers 200 mils. The range from this point to the trench is therefore 1,200 yards.

$$R = \frac{300 \times 200}{200 - 150} = \frac{60000}{50} = 1,200 \text{ yards.}$$

We have come to a river bank, and a village across the river covers 150 mils. An observer walks back 200 yards, keeping our party on the river in line with the village, and finds that at that point the village covers but 120 mils. The range from the river bank to the village is therefore 800 yards.

$$R = \frac{200 \times 120}{150 - 120} = \frac{24000}{30} = 800 \text{ yards.}$$

CHOICE OF AN AIMING TARGET

87. The choice of an aiming target depends primarily on the available features of the terrain that are immediately in line with the area that is to be covered with fire. At ordinary ranges, care must be taken not to choose an aiming target so that a negative sight setting will result. Skylines are not often available on this account. Assuming that the enemies' line to be covered with fire is of the same length as our line, there are three satisfactory aiming targets from a theoretical standpoint.

88. First, an aiming point so far in rear of the enemy's line (several miles) that our fire will be very slightly convergent. In this case the distribution and accuracy of our fire ought to be excellent, but if the aiming point is too close, the flanks of the enemy will not be covered.

89. Second, an aiming target consisting of a well-defined horizontal line within a hundred yards or so of the enemy's line. In this case the accuracy of our fire ought to be excellent, but the distribution will depend on the training of our troops since they must fire on the part of the aiming target immediately to their front in order that the distribution will be good.

90. Third, an aiming point half-way between us and the enemy so that all our fire will cross at the aiming point and the fire of our right flank will strike the enemy's right flank. In this case, the accuracy and distribution should both be excellent, but here again, if the aiming point is not exactly halfway to the enemy, our fire may cover too much or too little of his line.

91. Considerable judgment and experience is required in the choice of aiming targets. Excellent results may be obtained by their judicious use, but they should rarely, if ever, be used if the real target is visible to the firing line.

92. The vertical scale, which is a reproduction of the rear sight scale of the Springfield rifle may be used in connection with auxiliary aiming points and spotting.

93. To use the vertical scale, the graduation marking the true range is laid opposite the target. The selected aiming point will then fall opposite the sight setting to be used by the firers.

94. If, for example (see Fig. 1), the target is a line of heads 900 yards away, the graduation 900 on the scale would be laid on the line of heads seen through the glasses. Any one of several aiming points will then be opposite the appropriate graduation on the scale to be used against this or that aiming point. The sky line, for example, crosses the scale at 500. If aim be taken on the sky line with scales of 500 yards set on the rear sight, the bullets will hit in the line of heads at 900 yards as intended. The bottom wire of the fence immediately in front of the firers crosses the scale at 1,800 yards (the observer lying prone on the firing line), and if the firing line aims at this lower wire with 1,800 yards elevation, the bullet will fall in the line of heads as before. In fact, the entire landscape is available to the director of the fire, who has but to choose that point or line which, because of the color, shape, or nearness, would make the best aiming point in that particular field of view.

FOR SPOTTING

95. The correction of sights, as a result of ranging, is based upon the observation of the impact and the subsequent estimate as to its distance and direction from the objective.

96. In known distance practice, the strike of the bullet is on the vertical surface, and when the position is shown by the marking disk, the sight is corrected accordingly.

97. In combat however, the observation of impact is usually on the surface that is rising with respect to the line of sight. In such cases, the correction of the sight must compensate not only for the horizontal distance short or over but also for the vertical distance above or below the objective.

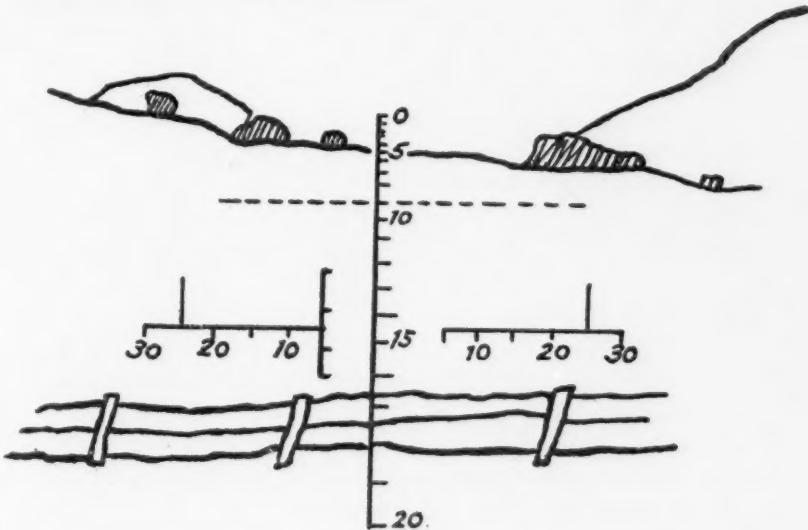


FIG. 1

98. In practice, the actual distance in yards that the center of the impact is distant from the target must, in most cases, be estimated. The vertical correction, however, may be measured with a fair degree of accuracy by using the vertical scale.

99. To measure the amount of this vertical correction with the glass place the graduation of the range scale corresponding to the elevation actually used in coincidence with the target, then the graduation opposite the point where the impact was noted will be the elevation necessary to use in order to correct for the vertical

error. It is to be noted that this vertical correction gives the range (in terms of the sight) to the point of impact.

100. The vertical correction having been made, then the correction is completed by adding (if the impact is short) or subtracting (if the impact is over) a number of yards equal to the estimate of the horizontal distance from the impact to the objective and setting the sight accordingly.

Figure 2 will illustrate this method.

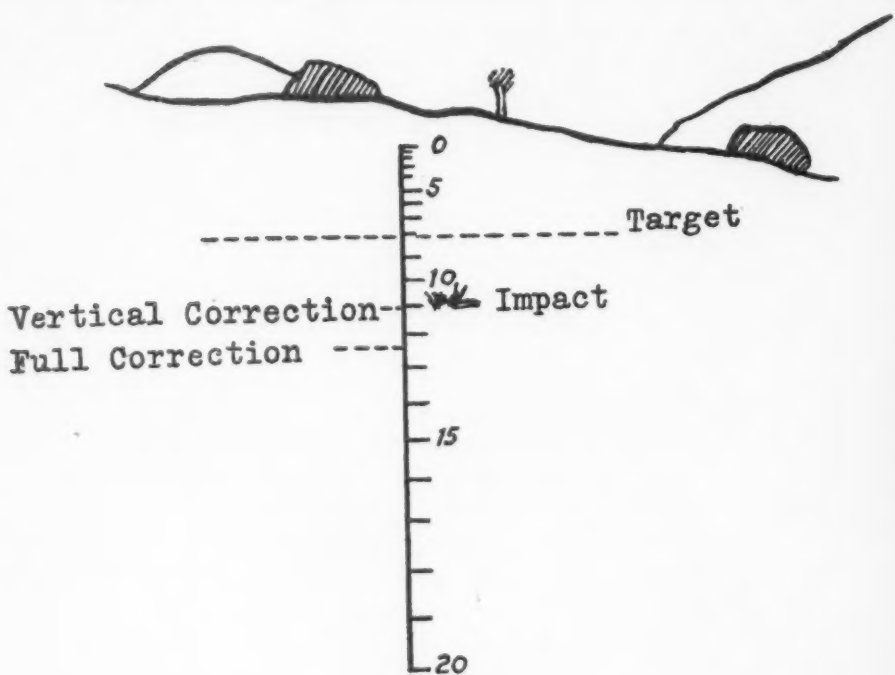


FIG. 2

101. Assume the range to have been estimated at 800 yards. Then with the 800 yards graduation held opposite the target, the splash of impact is observed opposite the 1,100-yard graduation and is estimated to be 150 yards short. The full correction therefore would be 1,100 yards (vertical correction) plus 150 yards (horizontal correction) or a final elevation of 1,250 yards as a result of this observation.

SOME NOTES ON MUSKETRY TRAINING AND FIELD EXERCISES

LIEUTENANT COLONEL HARRY LEE, U. S. M. C.

MUSKETRY INSTRUCTION

THE object of the attached instructions is to bring about a uniform training in the companies of this battalion in order that when the battalion is assembled for any exercises, tests, or maneuvers, the action may be machine like, and the individuals be perfectly at home, whether the units be intermingled or not. To this end, first, the exercises laid down must be taken up and gone through with in a *thorough manner*, supplemented by a short talk by the company officers, who should explain in detail the object sought in each particular exercise. Next, the tests should be taken up and, in them *the rules should be rigidly applied*. Any laxity in this only begets unwarranted confidence.

METHODS EMPLOYED

Talks.—The company should be assembled on the ground as soon as any exercise or test is concluded, for the purpose of a talk or critique on the work, and each officer should say a few words, in criticism or praise, of the manner in which the exercise or test was performed. This is the time to correct mistakes and make detailed explanations of matters which the men have failed to grasp and thoroughly understand, and these talks should be delivered in two-syllable words within the men's comprehension; technical terms should be clearly defined, the object being to teach the men and clear the matter of all mystery.

Signals.—All signals used in our extended formations for the direction and control of fire and movement of the troops, are from the drill book, Field Service Regulations, the various pamphlets issued by the Musketry School, and the reports of musketry exercises; there is no elaborate, complicated, or difficult feature about it, and it should be readily understood by any officer joining, provided he has studied the first two publications above mentioned. No effort should be made to execute any of the movements by

sections of the line until the signal is thoroughly understood by all the individuals concerned, and, to indicate this, squad leaders should expose the palm of the hand to the section chief when the squad has received and understood; the signal of execution is then made. Likewise the target should be clearly understood, and sights correctly set before any firing takes place. In making signals, company commanders, section chiefs, and squad leaders should not expose themselves by rising, but keep as low as is consistent in making the signal plain to those for whom it is intended; nor should any officer or man, who is to participate in any advance, rise before the signal of execution to advance, for in doing so he gives notice of it to the enemy. An officer or noncommissioned officer, to conduct the advance, must gain his place in the advance by a little extra speed.

Exercises.—Exercises 1 and 2 are to train the individual to set his sights quickly and accurately for the announced range and windage, and to accustom officers to the giving of range and windage data; for this object the above exercises are most important, and no detail in the correct and rapid accomplishment of these exercises can be neglected. Careful stress should be laid on each detail.

Covering Fire.—This is a matter of the utmost importance, and men should be taught to realize that the whole sector, a part of which they cover, must be looked after, during the time they are advancing and consequently have ceased to fire, by some other part of the line; or by a more rapid fire to maintain the volume and cover the part of the hostile line from which, for the moment, they have ceased their fire. The method of accomplishing this is by one of two ways, switch or overlapping.

Target Designation.—Careful attention should be given to this feature of the soldier's training in order to insure his quickly locating the target from your description. The clock-face system will be found to work well in many instances—the horizontal face to locate a reference point, and the vertical one to be applied to the point. First to locate the target the vertical clock face may be marked on a pane of window glass, to be held on the reference point by the man, with its center on the reference point, and the six and twelve o'clock line vertical the distance on any line such as quarter, half, or three-quarters toward a certain hour mark; the appearance of the target can be told him, and he can try from this information to locate it, or the land in front might be imagined a baseball field,

he standing on the "home plate," and to find a target in "left field" or some other section about so many yards distance from the "plate."

Communication.—On the value of this subject too much cannot be said. When the company has been committed to fire action, verbal commands cannot be heard, much less understood, though men can *see* and *feel*, so through the senses of touch and sight information must be transmitted. Exercises 5 and 6 afford means of training all the men to get and give information concerning fire and of intended movements, so should be practiced whenever opportunity affords, and nothing should be slighted in this particular. Under this head all officers should be thoroughly taught the ideas expressed in paragraphs 26-29, "Musketry Tests and Exercises," and strict attention being devoted to the reference contained in paragraph 28.

Tests.—Next after the foregoing come the tests, and they are simply the carrying out of the exercises under certain rules, restrictions, and conditions. All of these should be carried out to the *letter* in order to measure the probable efficiency of each organization practicing, in other words, to secure their figure of merit.

Conclusion.—In conclusion I want to say that the faithful effort of every officer of the battalion is absolutely necessary to the success of the battalion as a *tactical* unit. It requires teamwork, and teamwork requires that each member have a task, which he must *thoroughly understand*; he must know what to do, and when and how to do it *quickly* and *accurately*. Mutual support is necessary throughout. The proper direction of the advance must be continually watched by the leaders of units, especially in the base; all should endeavor to advance directly on the *point at which they fire*. The company commander and chiefs of sections make the signals, each to the unit leader next below, and observe the proper execution of movements, the effect of the fire, and the keeping of direction. In order that this may be properly done the duty sergeants, with these leaders, should constantly watch the commander next higher for signals, and keep his chief informed; squad leaders should so place themselves, preferably in the center of their squads, a little retired, head about on line of men's knees, and watch their chief of section, excepted when firing. All others should look to their target, in order that, on arrival at the position, their bayonets may pierce that at which they have been firing during the advance.

Succession to command of company will be by actual military rank, and for squads by seniority therein.

Ammunition supply is under consideration, but it should be understood that all reinforcements to the line should carry extra ammunition to be swapped with those already on the line, for information as to range, sector, etc.

Leaders of elements in company are designated as follows:

- o—Squad leader.
- X cos—Chief of sections.
- o d.s.—Duty sergeant.
- o C. C.—Company commander.
- o 1st Sgt.—First sergeant.
- ..—Field musicians.

COMPANY INSTRUCTIONS

- | | |
|---|---|
| 1. Exercise 1.—Ranging }
Exercise 2.—Ranging } | By company. |
| 2. Target designation. | Horizontal clock face system
Vertical clock face system
The finger measuring system
The auxiliary aiming point system } By squad |
| 3. Covering fire. | Overlapping method } By company
Switch system |
| 4. Target designation. | Exercise 3 to individuals
Exercise 4 by squads |
| 5. Communications and signals. | Exercises 5 and 6 by squads.
Paragraphs 26–27–28–29, by company |

6. It is desired that the instruction in the companies of the battalion be carried out as above indicated in order that uniformity may prevail, to the end that the battalion exercises and tests may be smooth.

Teamwork is essential to success in most of the games played, and it is not deemed necessary to go further than to state that the undersigned asks the united support, on the lines indicated, of all officers to promote the efficiency of this battalion as an infantry unit in *musketry, our specialty*.

COMPANY SIGNALS

Extended Order Drill, Whistle Signals

- | | |
|----------------------|-------------------------------|
| Attention to orders. | A short blast of the whistle. |
| Suspend firing. | A long blast of the whistle. |

Arm Signals

Forward.	Carry the hand to the shoulder; straighten and hold the arm horizontally, thrusting it in the direction of march. This signal is also used to execute quick time from double time.
Halt.	Carry the hand to the shoulder; thrust the hand upward and hold the arm vertical.
Double time.	Carry the hand to the shoulder; rapidly thrusting the hand upward to the full extent of the arm several times.
Squads right, March.	Raise the arm laterally until horizontal; carry it to a vertical position above the head, and swing it several times between the vertical and horizontal position.
Squads left, March.	Raise the arm laterally until horizontal; carry it downward to the side and swing it several times between the downward and the horizontal position.
Squads, right about, March.	(If in close order), or to the rear, March, (if in skirmish line), extend the arm vertically above the head, carry it laterally downward to the side and swing it several times between the vertical and downward position.
Change direction, or column right (left), March.	The hand on the side toward which the change of direction is to be made is carried across the body to the opposite shoulders, forearm horizontal; then swing it in a horizontal plane, arm extended, pointing in the new direction.
As skirmishers, March.	Raise both arms laterally until horizontal.
As skirmishers, guide right (left), March.	Raise both arms until horizontal. Swing both simultaneously upward until vertical and return to the horizontal; repeat several times.
As skirmishers, guide right (left), March.	Raise both arms laterally until horizontal; hold the arm on the side of the guide steadily in the horizontal position; swing the other upward until vertical and return it to the horizontal; repeat several times.
Assemble by squads, March.	Extend one arm horizontally and swing the hand up and down from the wrist, at the same time raise the other arm to its full extent and describe horizontal circles.
Squad column, March.	"N"
Section column, March.	"U"
Assemble by section, March.	Raise one arm horizontally and describe small circles with the hand, at the same time raise the other arm to its full extent and describe horizontal circles.
Assemble, March. (Company)	Raise the arm vertically to its full extent and describe horizontal circles.

Firing

Commence firing.	Move the arm to the right and left in a horizontal plane in front of the body.
Fire faster.	Move the arm rapidly to the right and left in a horizontal plane.
Fire slower.	Move the arm slowly to the right and left in a horizontal plane.

Note.—If any of the signals for firing are given in connection with the signal for squad or section, the signal applies to the designated squad or section only.

MUSKETRY TRAINING AND FIELD EXERCISES 301

Ready (to fire).	Raise the hand, fingers extended and joined palms towards the person addressed.
What range are you using?	Extend the arm toward the person addressed, one hand open, palm to the front, resting on the other hand, fist closed.
To swing the cone of fire to the right.	Extend the arm to its full length to the front, palm to the right; swing the arm to the right.
To swing the cone of fire to left.	Execute as above, substituting Left for Right.
Fix bayonets.	Simulate "Fix Bayonets."

ADVANCE BY RUSHES

Being in skirmish line to advance by rushes the signal for squad or section will be given, the designated fraction will advance *on the run* to a point selected by the subdivision leaders, take cover and open fire; as soon as the first subdivision has opened fire the second subdivision will advance and halt on the same line.

It must be borne in mind that the rushes by fractions of the line must be executed by the men rushing as close to the ground as possible and on the run, thus offering the smallest target and minimizing the time of exposure, all must drop together, and if anyone is out of place he must gain his proper position by crawling.

CONVENTIONAL FLAG SIGNALS (OR MADE WITH ARMS)

Letter of alphabet.	If signaled from the rear to the firing line.	If signaled from the firing lines to the rear.
AAA.....	Ammunition going forward.....	Ammunition required.
CCC.....	CHARGE (mandatory at all times).	Am about to charge if no instruction to the contrary.
F.....	Commence firing.	
CF.....	Cease firing.....	Cease firing
D T.....	Double time.....	Double time or "rush."
F B.....	Fix bayonets; rear rank fix first, and when they resume firing the front rank will fix.	
G.....	Move forward.....	Preparing to move.
HHH.....	Halt.	
K.....	Negative.....	Negative.
L.....	Left.....	Left
O.....	What is the range, etc.?	What is the range, etc.?
P.....	Affirmative.....	Affirmative.
R N.....	Range.....	Range.
R T.....	Right.....	Right.
S S S.....	Support going forward.....	Support needed.
S U F.....	Suspend firing.....	Suspend firing.
T.....	Target.....	Target.
D, Forefinger extended	Advance by file.	

From Battalion Commander to Support

R R Reinforce the line on the *Right*.
 R L Reinforce the line on the *Left*.
 R C Reinforce the line in the *Center*.

NOTES—COMPANY IN EXTENDED ORDER

Situation.—Company in rendezvous position.

Action.—Deploy on designated line, call chiefs of section, assign sectors to sections and designate method (switch or overlapping of cover fire, call range estimators, send section chiefs to posts with information and instructions to the squad leaders who impart it to their squads, send estimates to their sections, get range from first sergeant, and signal it to section chiefs, who signal it to squad leaders, who signal it to their squads, all done by signals; this completed, squad leaders watch for signals from section chiefs; duty sergeants watch company commander for signals.

Advance.—The advance from the rendezvous position to the first firing position will be made in thin successive lines (by file), the chief of the center section taking this first line forward will watch to the keeping of proper direction, and be informed by his duty sergeant, who will accompany him, of any signal from the company commander, watching him carefully for this purpose, No. 2 will be conducted forward by the chief of the first section; No. 3 by the chief of the third section, and No. 4 by the squad leaders, each starting forward as soon as the preceding line halts on the new alignment established by No. 1.

Duty sergeants accompany their section chiefs, watching for signals. From the first firing position the advance will probably be made by sections of the line, therefore, the duty sergeants with each chief of section must constantly watch for and communicate any signals from the company commander to the section chiefs, squad leaders watch their chief of section for signals and communicate them to men of their squads by, if firing is in progress, catching hold of the two center men of the squad, and making signals to them with the hand, these two men communicate the signal to the men next to them by the same means, each man, as he understands, signifies it by exposing the palm of his hand to the squad leader, each squad leader makes the same signal to the chief of section when his squad has correctly understood and is ready to advance.

Formation for the Advance.—When the entire section is ready to advance its chief makes the signal "FORWARD" in conjunction with the section or squad signal if the advance is to be in section or squad column. Succession to command of company according to military rank. Succession to command in sections, duty sergeants and the senior corporals.

RÉSUMÉ

1. It is the desire of the undersigned to make the instruction of the men *thorough*, and, at the same time, *interesting*. This cannot be done if any mystery is to cloak any portion of it, hence the necessity for *full explanation in two-syllable words*, avoiding technical terms.

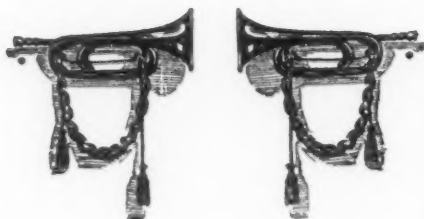
2. As all officers are called upon to teach and to criticize, it is necessary that all study closely the publications mentioned in this paper, in order that each may have a thorough understanding of the matter.

3. It is very well known to us all that very often a company or other unit is taken out by its officers and put at some field exercise or maneuver without any knowledge, worth considering, of the tactical principles involved, the exercise is pushed through uninterruptedly, with the result that a great many things occur which are altogether wrong (glaring errors). They are not corrected, consequently, the men have not learned anything, and the time consumed has been wasted absolutely.

4. On the other hand, picture an organization in which the officers have studied carefully and comprehended all the details of troop leading and musketry, and as carefully taught, in words within their grasp, the men of their organization, through all the phases of combat exercises and maneuvers, it is seldom necessary to halt for correction of many important things which are bound to occur in any organization not so trained. In action such halts cannot be made. All of the men must have had *thorough previous training* to fit him for this *phase*, a training that has cost him no more than slightly wounded feelings. (In a supersensitive soldier.)

5. Let us understand, if we have not already done so, that all the responsibility for most of the casualties in the units is chargeable to the officers, if they have not, when there was time, taken advantage of it to increase their own knowledge and to *teach it all* to those under their command, for use in the field.

6. General Von Bulow, after a company of the 20th Regiment of Infantry had ceased its field firing problem, said: "Colonel, are you ready for the critique?" The colonel replied: "We are waiting for the data regarding the percentage of hits obtained." "What for?" asked the general. "Do you think I am here to see if the soldiers fire well? What I do want is to take advantage of the main object of the exercise—to inform myself of the tactical preparation shown by the officers and troops."



PAPER WORK

COLONEL LOUIS J. MAGILL, U. S. M. C.

WHEN any particular duty becomes in the minds of a vast majority of the officers both a hardship and a nuisance, and when this same majority appears to be of the opinion that much of this duty is unnecessary, it is fair to assume that there is something wrong with the procedure.

Being one of the few officers in the Marine Corps who has had the opportunity of viewing the required paper work from the point of view of Headquarters of the Marine Corps, and the point of view of the organizations rendering the various reports and returns, I feel that my status is sufficiently unique to warrant a few comments on the subject in the hope that this brief article will give rise to a great deal of constructive criticism with resultant advantages to the Corps.

It is the firm belief of many officers that the company as a unit is now overburdened with paper work, necessitating the selection of a first sergeant not because of his military qualifications, or his ability to handle men, but primarily because of his familiarity with company paper work, and this is a condition of affairs which I believe to be all wrong in time of peace and almost criminal in time of war.

After practically three years' continuous service as brigade adjutant and adjutant general, I am prepared to state that practically all of the paper work of the company when the company is not an independent unit can be handled by the Headquarters of the larger organization, whether it be battalion, regimental, brigade or division. I believe that this should be done and the result would be satisfactory to the company and to the higher organization.

This may seem radical and revolutionary, but I know its accomplishment is simple and practicable, and would require at regimental, brigade or division headquarters a much smaller number of men for clerical duty than are now actively engaged on this work in the various companies and are therefore not available for purely military service.

So far as I am personally concerned I can see no necessity for the

muster roll, and one of the worst nightmares of the company commander would be dispelled by the abolishment of this sheet. When a man enlists in the service all data regarding him are immediately recorded at Headquarters of the Marine Corps, and thereafter everything of real moment in his career becomes a matter of record there, but why the trivial happenings of this man should be recorded monthly at the headquarters of the Marine Corps, I am unable to see. An offense sufficiently serious to become a part of the current record of a man at the Headquarters of the Marine Corps usually results in a trial by court-martial, and a record of this trial is forwarded to Headquarters immediately upon approval, but why the Headquarters of the Marine Corps should be notified at the end of the month of the fact that a certain individual has been given two hours extra police duty for being late at reveille roll call, or given any other punishment for any offense not serious enough to require even a deck court, or has been on the sick list, I am again unable to see. This information is all recorded in the service record and such record is sent to the Headquarters of the Marine Corps upon the expiration of enlistment.

As this question has been discussed before, and as there is strong opposition to the abolishment of the muster roll in certain quarters, I would suggest that a new form of muster roll be adopted so that a single sheet would be used monthly for each officer and man, and that each one of these sheets be posted daily covering any change in the status of the individual with all other information that is now required on the muster roll. Duplicate copies of all entries on this sheet would be made on a similar sheet which would become the retained copy of that man's record, and at the end of each month the original sheets would be sent to Headquarters of the Marine Corps and these sheets filed in the jackets of the interested parties.

It would be far better if only such sheets were required to be forwarded to Headquarters as contained remarks or information indicating some occurrence worthy of note, or a change in the status of the individual, but this procedure would leave the inevitable doubt at Headquarters as to whether all necessary sheets had been forwarded, and by sending all of the sheets this doubt is eliminated.

The tri-monthly report of strength and distribution, the monthly report of drills and instructions, and the monthly report of noncommissioned officers' school should all be matters of direct information

to the organization commander of larger units, and it might well be left to the commander of the larger organization to see that the drills and instructions, and noncommissioned officers' school are carried out in accordance with the known wishes of the Headquarters of the Marine Corps.

The muster roll and these monthly reports, especially if the form of muster roll be modified so that the record can be completed daily, can readily be made out at regimental, brigade or division headquarters for each organization, the information being supplied by informal memoranda from the company commanders when anything occurs that should be a matter of record, and the monthly reports if still desired by Headquarters, could be made out by the regimental, brigade or division headquarters, the information being obtained in a similar informal manner.

A company has very little paper work in connection with the Quartermaster's Department as the company receives its material by memorandum receipt, so I am not prepared at this time to offer any suggestions regarding this department.

As to the Paymaster's Department, I believe the companies should be relieved entirely from making out the pay rolls and that these rolls should be made out at the big headquarters, be it regimental, brigade or division, the necessary information being furnished from time to time by informal memoranda from the company commander to the paymaster having the accounts. This may appear to be a rather drastic remedy, but when thought over calmly I believe the paymasters themselves will be willing to undertake this or at least to make the experiment, and I believe the work can be done without nearly as great an increase in the clerical force of the paymaster's office as is now required by having one man at least in each company on pay roll work.

It is my belief, were I the adjutant general of a division, that I could with five competent men carry on satisfactorily all the paper work now required by the Adjutant and Inspector's Department for the companies, battalions, regiments and brigades, which would relieve a great many men for military duty and would concentrate the clerical work in an office where a few thoroughly competent men would be on the job and able to handle it scientifically.

The same system can be applied to marines at sea, the fleet marine officer being responsible for the paper work of the marine detach-

ments in the fleet, and in case of a ship acting singly the marine officer in command of that detachment would of course have to render the usual reports just the same as if his detachment was an independent one-company post.

I hope that officers who read this article will not hesitate to criticize it severely as I believe that the whole subject of paper work should be thoroughly aired throughout the entire corps. This article is merely meant to "start something" in the hope that by proper agitation we can arrive at a working basis by which the paper work will be concentrated in a few competent hands, and the much harried company commander relieved from all unnecessary clerical work in order to leave his mind free for the military work.



ADVANCED BASE SEARCHLIGHTS¹

MAJOR HOWARD C. JUDSON, U. S. M. C.

THERE is no essential difference between a military searchlight and one intended for marine use or in civil pursuits except that the military lamp is usually far more portable. This is true in the smaller type of projectors which has been developed for Advanced Base work but it is not so with the larger types. This is a point where military requirements must give way to mechanical ones and the necessity of a quick and accessible source of supply for replacements must be considered. To make a light and easily portable projector, it is necessary to use aluminum which is expensive and deteriorates rapidly under the influence of sea air.

A special type of lamp would prevent our drawing on the supply ship for new parts in case of breakage. As the Advanced Base forces are a part of the Atlantic Fleet, it is necessary that our equipment so far as possible be the same as used aboard our naval vessels. It is to a certain extent true that that marine type of lamp is too heavy and unwieldy for advanced base work where we have to penetrate the tropical jungle, drag our equipment up cliffs and across ravines on short notice after landing it, possibly in the surf, from a ship's boat. Aluminum deteriorates from salt air but so does cast iron when not properly protected. The remainder of our outfit is not the same as the machinery in use aboard ship because we have an internal combustion engine in the generator set, while the ship naturally uses a steam-driven one. In the smaller type we think that we have the ideal projector to cover beaches which are being approached by landing parties of the enemy, or if he succeeds in effecting a landing, to cover the terrain in front of our position.

On the Western front it has been found that the average time that it is possible to use a searchlight without a strong probability of losing it, is thirty seconds. This of course is where the projector is directed on the enemy's position from a point near the first line trenches. In these days of extremely accurate artillery fire and

¹In the preparation of this article and the accompanying sketches acknowledgment must be made of the assistance rendered by Marine Gunner Ralph F. Thompson, M. C. R., a patriotic engineer, who gave up a lucrative salary to take that of a marine gunner, for the period of the war.

innumerable batteries, the reason is not hard to deduce. Suppose we are using a light at "L," Fig. 1, the enemy's two observers at "A" and "B" immediately see it. Each has an azimuth instrument set up with the other's position as zero. "A" reports, "Searchlight to my right front, angle LAB is 45 degrees." "B" reports, "Searchlight to my left front, angle LBA is 40 degrees." The fire director plots these angles and the intersection of the lines AL and BL gives the position of the light. Knowing the position of the light it takes but a moment for him to give suitable instructions to the battery at "G" and to fire the first salvo. In less time than it takes to tell it, the light has been brought under an effective fire. If the first salvo does not hit it, it is certain that succeeding ones will, so it is

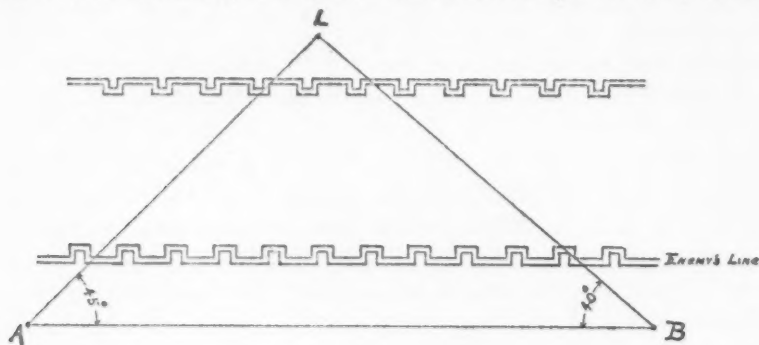


fig. 1.

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necessary to move it instantly. If the projector is light and easily portable, this is not a difficult task and in a few moments the light is shining elsewhere; but if the light is heavy and unwieldy or is fastened to an elevating tower, which takes two or three minutes to lower and then requires that horses be brought up to drag the lamp cart away, it is certain to be lost. Only when the enemy's artillery is so busy repelling an attack that it cannot afford to waste the time necessary to destroy the searchlight is it safe to use one for any length of time on the battlefield. As stated before, at other times it is possible to use it but for a few seconds, and then it must be obscured and removed to another locality. In order to get the desired portability we took a commercial lamp and so modified it

that now it weighs but 56 pounds where it formerly weighed 150, and is not only as powerful as before but is slightly more so. This type of lamp we believe to be the ideal one not only for lighting beaches when the enemy is attempting to land but also for the "shine, obscure, run" tactics necessary when the enemy is ashore and supported by ample artillery.

Before deciding upon what equipment to get for a certain purpose, it is sometimes well to look over unsuitable machinery and decide what not to get. For instance, let us consider the elevating tower, two truck type of apparatus. This particular equipment is a copy of a German outfit which the Germans themselves no longer use. It consists of two horse-drawn field artillery caissons. The Germans did not use the two-wheeled horse-drawn set because there was any particular virtue in a horse-drawn set, but because fuel for internal combustion engines is scarce and they needed it for other purposes. The vital parts of an automobile truck—and we have a type that can go practically anywhere a horse can—are not nearly so large a target as two horses, and a truck does not rear and back when under fire. Moreover a truck can travel for many hours without rest moving at a far higher rate than a horse and its fuel is not so bulky or hard to transport as the forage necessary for horses. A truck has the power of many horses and can carry a more substantial set. Incidentally, when a truck gets hit in a vital part with a bullet or shell fragment it usually can be repaired at small cost. At least, it can be broken up for spares. When a horse is hit, he not only is worthless but must be buried. For our work, of course, horses are out of the question as they cannot be carried in the number required on battleships or aboard our transports, but even if they were available it would not be good practice to use them. In the set seen by the writer, on one of the caissons is mounted the generator set, in a space so constructed that suitable engine with proper cooling area is out of the question. It is marvellous that the designer was able to get a generator set within the space and weight limits imposed that would work at all. This particular generator set will work for a time, but not for long. The reason why it will not stand up under the strains of field service and what must be provided in the way of generator set suitable for military work cannot be set forth here, or it would not be possible to discuss anything else in this article without exceeding the space allotted me.

It is sufficient to say that you cannot send a boy to do a man's work and expect that he will do it for more than a few hours.

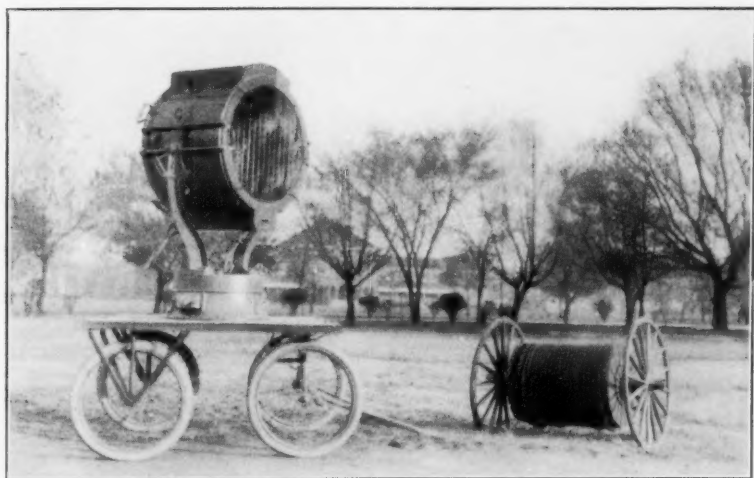
The second caisson carries the searchlight, an elevating tower and the reel of cable. The reel of cable is much too short. The French use 300 meters of cable; we use 1,000 feet and wish that our limitations as to weight were such that we could use more. This particular reel of cable contains but five hundred feet thereby requiring that the searchlight and the generator set be operated near one another; so near in fact that the enemy, by searching the vicinity of the searchlight with artillery fire, would likely get the generator set as well as the lamp. The searchlight is of an excellent type but it is too small for anti-aircraft work and too large to permit that portability which is so essential if it be intended to use the light in the vicinity of the firing line. The searchlight is mounted upon a telescopic elevating tower. The three sections of the elevating tower fit closely within one another, so closely in fact that one rifle bullet would jam the sections so that the tower could not be raised or lowered according to its condition at the time it received the damage. The tower is raised and lowered by means of a flexible steel rope passing over a hand operated drum. It takes nearly three minutes to elevate the tower, and when lowered by the people who built it, it took nearly two minutes to get it in a position where the caisson could be moved. This, of course, was assuming that no cable had been unreeled, which in practice never will be the case. As the cable reel is mounted upon the same caisson as the searchlight, it will be necessary, when this outfit goes under fire, to first obscure the lamp and lower it, then hitch the horses and proceed toward the generator set at a most leisurely pace reeling in the cable as it goes along. Reeling up cable is by no means a quickly accomplished task. It is manifest that the elevating tower was provided in order that the outfit might be operated in the vicinity of the firing line. Poking the searchlight a few feet nearer to aircraft would in no way increase its effectiveness so we must assume that the elevating tower was provided in order that the outfit might be used in first line work. As we have already seen, the tower takes too long to lower, the horses take too long to hitch up, and the cable takes too long to reel up to ever permit of this outfit being used more than once near the firing line. Long before it can be gotten out of danger it will be destroyed. We

believe that we have profited by the experience of the French and as a consequence we do not attempt to use an elevating tower. At best the elevating tower gives the searchlight a command of but fifteen feet. If the ground be flat no command is necessary. If the ground be rolling or very hilly a command of fifteen feet is of no consequence as the slightest elevation will interfere with the use of the light. As a consequence the lamp must be taken to some site overlooking the enemy's lines. It is therefore easy to see that as we have to go to a hill-top anyway the elevating tower is not only of no value, but is an impediment without the slightest redeeming feature. In the old days when we had to face direct fire only it would have been possible to place the searchlight just behind the brow of a hill and by elevating the tower shine the light upon the enemy without exposing its crew. In these days of indirect fire it matters little whether the light be on the front face of the hill, the top, or the rear face. Modern high angle fire will reach it wherever placed, and fire is to be expected in a few moments after the searchlight has been shown.

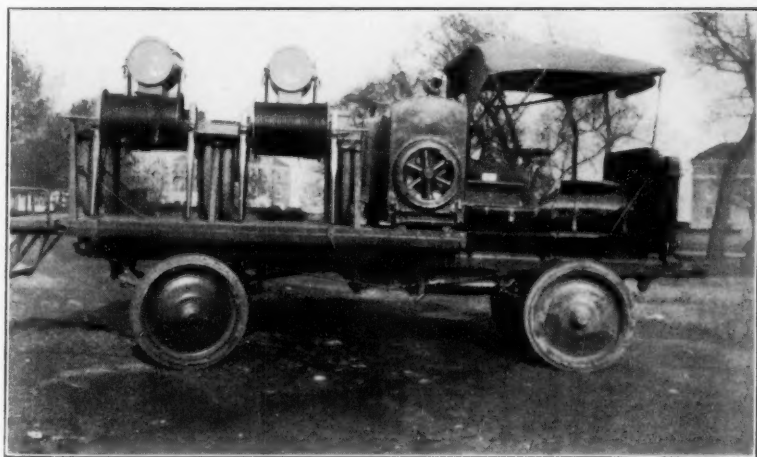
As a consequence of the fact that we must expect an effective fire a few moments after we start to use the lamp we must be prepared to obscure the lamp, move it rapidly from the vicinity and get our cable away from the spot as quickly as possible. In order to do this we mount the large searchlights upon a light man-drawn four-wheeled cart. The cable is carried on a small cart of its own. We use as much as we can in order to get our generator set sufficiently far away from the lamp that a stray shell will not destroy it. When the lamp is fired upon, the cable is instantly withdrawn from its receptacle in the base of the lamp and the dynamo tender notified by telephone to shut off the current. The crew then withdraw the lamp from the vicinity as rapidly as the terrain permits. The non-reversible plug on the searchlight end of the cable is provided with a protector which slides over the plug when the cable is dragged along the ground. While the lamp crew are removing their lamp the linesmen and spare dynamo tender have seized the cable at a point about two hundred feet from where the searchlight formerly was and are dragging it toward the generator set. If the fire of the enemy is too hot to salvage the cable it is left on the field to be picked up and repaired later. At the same time that the lamp crew and linesmen have been doing the above, the dynamo tender and the

noncommissioned officer in charge have gotten the automobile truck upon which the generator set is mounted under way and are already proceeding to a prearranged point where all parties meet to recommence operations. The foregoing applies to our large searchlights which we do not believe entirely suitable for firing line work and which we expect to use for anti-aircraft protection and operations against vessels of the enemy. Our searchlight is larger and more powerful than the one used in the horse-drawn set we have discussed, yet we are able to take it to places where the horse-drawn set cannot go and get it out of danger in a small fraction of the time necessary to remove the smaller lamp. In our light, extremely portable type of searchlight we have a lamp which one man can take anywhere that a man can go and which can be removed from danger in an instant. This type of light is carried on a two-wheeled buggy which also carries the cable reels. The handles, which are placed fore and aft, fold down and act as steady rests when the buggy is not in motion. The cable is carried on two reels of 500 feet each, which reels can instantly be detached from the buggy and thrown aside if the occasion requires. The lamp likewise may be detached from the buggy and carried to a place of safety by its tender. These light lamps take so little current that we run two of them to a generator set. They are connected in parallel so that either may be used while the other is not burning.

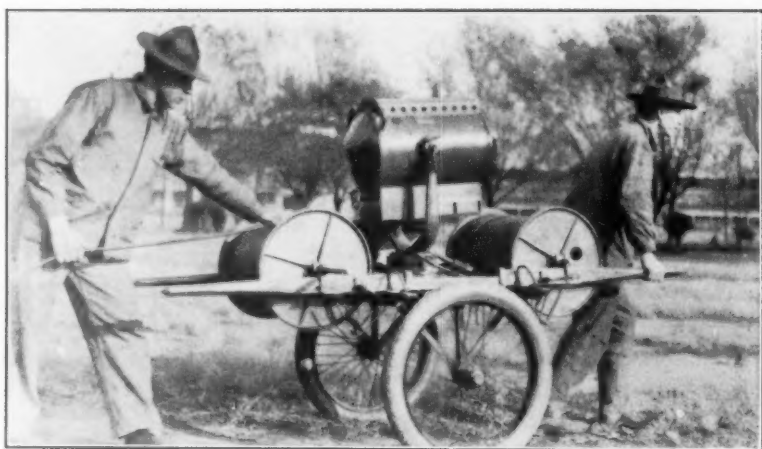
Our large type of lamp requires but six men for a crew. This allows a corporal in charge, two dynamo tenders, two lamp-tenders, and one linesman. When engaged in our normal work that of sweeping the sea in the vicinity of our mine fields the dynamo tenders and the lamp tenders divide the night into two watches of about five hours each. The linesman assists in running out the cable and in reeling it up. The corporal is at the generator set, where he receives the instructions as to the handling of the lamp, which instructions he immediately transmits to his lamp-tender by telephone. Not only is the crew ample to handle the outfit but their labors are so arranged that no one is overworked. With our lighter lamps, of which, as we have stated before, we run two to a generator set, we have the corporal and two dynamo tenders as in the larger set. We have two lamp-tenders and one linesman for each lamp, thus making the crews of the lighter lamp outfit to consist of one corporal and eight privates. As this personnel serves two lamps, it is an ex-



30-INCH LAMP, LAMP CART, AND CABLE REEL.



14-INCH OUTFIT READY TO MOVE



GOING INTO ACTION, 14-INCH

ceedingly economical arrangement. In advanced base work we cannot be too economical as regards special services as we will never have enough men for the infantry defense.

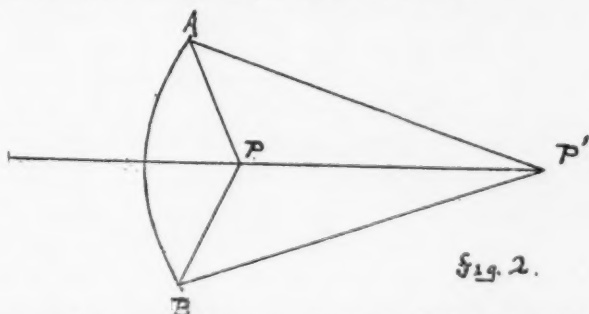
Thus far we have discussed the military requirements of searchlight outfits. We have said little about the light itself. A searchlight is a device by means of which the illumination emitted by some source of light is thrown in a more or less parallel beam upon a target which it is desired to illuminate. A searchlight must not illuminate its own vicinity because if it does the enemy who is firing at it will be able to see whether or not his shots are landing nearby. To hit a searchlight with direct fire, which is the kind of fire we will receive from enemy vessels engaged in an attempt to raid the base, is a most difficult task. We have shown before that the searchlight is most vulnerable to indirect fire but if the landscape in its vicinity is not illuminated and the spotter has only the bright beam of light staring him in the face in view, he will lose sight of his tracers as soon as the projectile gets anywhere near the beam and he will not know if his fire is going high or low. Moreover, naval ordnance does not use shells which are fitted with time fuses and it will not be possible for the spotter to burst his projectiles in front of the lamp and have a fragment disable it. He must obtain a direct hit upon the lamp itself or a hit so close to the lamp that the shell, which bursts upon impact, will destroy the lamp with its fragments. High explosive shell which is most effective in the confined spaces between-decks of a naval vessel is not very effective in the open air as the fragmentation is too small. Not only must the searchlight not illuminate its own vicinity but in addition it must illuminate a target often at a great distance. As a consequence all the light given forth by the source of illumination must be condensed so as to shine upon the target and upon the target only.

To effect this concentration of illumination a parabolic reflector is used in the searchlight barrel. The front door of the searchlight has no other function than to exclude insects and air. As all searchlights which are at all efficient are of the electric arc type and as we know that a strong current of air will seriously affect the luminosity of an electric arc, and in some cases even blow it out, we must protect the arc from air currents. This glass door diminishes the efficiency of the light by reason of its absorption. There is no such thing as perfection in nature and we cannot obtain a perfectly trans-

parent glass. The glass in the parabolic mirror also absorbs light and it, too, diminishes our efficiency. Some searchlights are provided with metallic reflectors, but these, which they have the advantage of not being completely shattered by one rifle bullet, are even less efficient than the glass mirrors. Some searchlights have the mirror divided into segments which are cemented together, and which division is made with a view to having but one segment shattered by a bullet or shell fragment instead of the entire mirror. These also are less efficient than the solid glass mirror because the segments warp more or less as they season, which warping is increased by the great heat generated by the electric arc. The glass door is made in strips so as to provide for expansion and to prevent the breaking of the door, which soon becomes very hot both from the electric arc inside and its own absorption, whenever a gust of cold wind, a dash of spray or a flurry of snow strikes it. The door when made in this manner is also less liable to be broken by the concussion of nearby guns. The electric arcs are invariably of the horizontal type, not vertical as in street lamps, and the reason for this we will presently show. The arc is regulated by an automatic mechanism which is intended to keep the flow of current across the arc constant and which accomplishes its purpose in a more or less perfect manner. The searchlight must be capable of pointing any direction in both altitude and azimuth. The Beck lamp possesses a serious defect in that it cannot be elevated to any degree and thus it cannot be used for defense against aircraft. It is therefore out of the question to consider the Beck light as a military searchlight. The two successful types which are in use are the old-fashioned plain electric arc type and the Sperry searchlight.

The older type of searchlight contains two carbons of which the negative is generally smaller, held in a horizontal position by standards which are moved to and fro by an automatic mechanism. Focussing was entirely by hand. The carbons were the same as used in the street lamps and in order to center the arc, the positive always was cored and the negative usually contained a proportionally smaller core. When over-powered the light given off is bluish and the carbons burn away rapidly. This light requires no ventilation except that given by allowing the hot gases to escape at the top of the barrel with the consequent entrance of cold air at the bottom. In order not to crack the mirror from the intense heat of the arc,

the focus is kept at a reasonable distance from the mirror and after using a searchlight, particularly on a cold windy or rainy night, the barrel must be kept closed until the mirror has cooled or it is certain to be destroyed. Some mechanisms are ratchet feed and some are motor driven, but both endeavor to keep the length of the arc such that the proper amount of current flows across the arc. The voltage required is not great. It varies from 45 volts in the small lamps to 60 in the largest and the amperes vary from 10 to 200. In the Sperry lamp, the negative carbon is inclined at a small angle to eliminate its shadow. Ventilating motors are provided and the positive carbon is rotated. The Sperry lamp burns its carbons faster than the ordinary type and they are in consequence very long. When intended to be used in anti-aircraft work both types of lamp are provided with a small wire screen to protect the mirror from fragments of carbon which may fall from the arc and crack or melt the face of the mirror from their intense heat.



If we watch a searchlight in action we will find that the negative carbon burns to a conical point and the positive assumes a cup shape. If we analyze its action we will find that the light which is utilized is given off by the intensely hot crater in the positive carbon, which contains a pool of liquid carbon. On account of the fact that with alternating currents our carbons both burn to a point and the source of light is the arc only which is varying in position as well as intensity, and as alternating current arcs require a higher voltage to keep up the flow of current across the arc, we immediately deduce that direct current only can be used in a successful searchlight. We could not focus the flickering arc and its luminosity is much lower than that of the bottom of the crater of the positive carbon in direct current arc. From Fig. 2 we see that if we place the

arc at a considerable distance from the mirrors at "P¹" we are able to utilize but a small portion of the light flux. As we approach the mirror, the angle "APB" becomes greater and greater. We cannot get very close for two reasons: first, as already explained, the intense heat of the arc will damage the mirror; second, the lips of the crater as is shown in Fig. 3 will cast a shadow. From these facts we deduce our first law which is: "The focal length shall be as short as the shape of the crater and the safety of the mirror will permit." If we examine Fig. 3, in which the carbons are not drawn to scale, we find that the negative carbon casts a shadow and if we look at the door of a burning searchlight we notice that there is a black spot in the center of the beam. If we could use an exceedingly long arc, in other words withdraw our negative carbon an infinite distance, we could get rid of this shadow but this is not feasible. Sperry attempts to get rid of it in his lamp by inclining the negative carbon but he only gets it in another place.

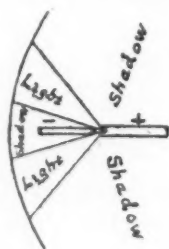
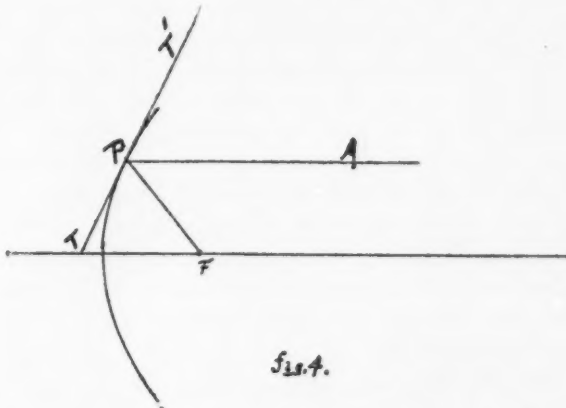


fig. 3.

One attempt which was made to cut down the shadow of the negative carbon consisted in increasing its conductivity by copper plating it and thus permitting a reduction in size. The negative carbon being smaller it cast less shadow. The increase in luminosity was not great and the color of the beam from the green flame of the copper was bad. It would have been better to have silver plated the carbon as the color of the light would have been better and because of the slightly better conductivity of the carbon the luminosity would have been greater, as we could have further reduced the size. To make ideal electrodes a substance which is practically infusible is necessary and that substance must be an excellent conductor. Its vapor must not introduce annoying color into the arc and must not sublime upon the mirror and door and thus decrease the power of the searchlight. There is still room for great

improvement in the electrodes and while carbon is good we hope eventually to find something better. Carbon has one excellent property in that its resistance decreases with the temperature. When the carbon electrodes are overpowered in an attempt to get a hotter and consequently more brilliant crater, the light turns blue. Soon after the First Regiment was formed we attempted to neutralize this by adding salts to the cores which would give off yellow light. Naturally the first thing we tried was sodium salts and particularly common salt (sodium chloride) but this fuses far too readily. The attempt was not a success and we stopped right there. Searchlight carbons is an excellent subject to refer to the Naval Experimental Laboratory when completed as there is an opportunity for improvement in projectors in this respect.



Optics teaches us that with mirrors the angle of reflection equals the angle of incidence. From analytic geometry we derive the law that a parabola is a curve so shaped that if we draw a line from a point on its major axis, which point is called the focus, to the curve, it will strike the curve at the same angle as a parallel to the major axis. Thus in Fig. 4, angle FPT equals angle APT'. Consequently if a source of illumination be placed at F the light given off will strike the mirror and be reflected out parallel to the major axis. But a point is a geometric location only. It has no dimensions. From this we deduce that the source of illumination of any projector must be of infinitely small area and as this light from a small area is to be spread over a large one at a great distance, the light must be of

infinitely high intensity. This we call the second law of searchlights. To show how important this is we can take as an example the so-called incandescent lamp type of searchlight. These are not searchlights at all but are merely exaggerated automobile headlights. In the Edison lamp a 750-watt nitrogen filled tungsten lamp is used. In the General Electric lamp a 150-watt lamp of the same type is the source of illumination. The Edison lamp is a 35 volt lamp and the General Electric is a 6 volt. The filament of a 35-volt lamp is many inches long and it is not possible to focus it. The area of illumination is too great. The filament of a 6-volt lamp is only one-sixth as long and it can be nearly focussed. As a consequence the Edison lamp splays its beam over a wide range, but gives no more illumination upon a given target than the General Electric lamp which uses but one-fifth as much power.

In the Sperry lamp special carbons are used, the cores of which contain metallic oxides probably thorium or cerium or both. We are all familiar with the great luminosity of these rare earths when heated to incandescence as they are used in gas mantles. As these substances are already oxides, they do not burn when heated and fortunately they do not readily vaporize. Carbon both burns and is comparatively easily vaporized. The efficiency of the Sperry light is due to the fact that through greater conductivity he is able to use smaller electrodes thus reducing his area of illumination, and the fact that the crater in the positive carbon is so much hotter not being cooled constantly by the latent heat of vaporization of the liquid it contains. The specific luminosity of the rare earths is also greater than that of carbon and consequently the light would be greater even if they were not hotter than the carbon electrodes in the ordinary projector. As a considerable amount of carbon is used in the Sperry electrode and as the current sent through a given cross-sectional area is greater, there is a blue color to the Sperry lamp due to the presence of the vaporizing carbon. This is troublesome in land work but is a positive advantage in marine work as we will show later. On account of the great heat Sperry has found it necessary to cool his standards with an air blast to prevent fusing or bending. The higher efficiency of the Sperry lamp is not due to the fact that the arc is luminous, as one of his engineers stated to me, but it is due to his decreasing the area of the source of illumination and increasing its intensity, and to those facts alone.

The arc cannot be gotten into focus and its illumination is not used.

There is one peculiarity of the searchlight which is not generally known and which consumes the specific brilliancy of the various parts of the beam. This peculiarity is easily shown graphically. In Fig. 5, we draw focal radii at equal angles with one another, using the major axis as the first. We find that the illumination is higher near the outside edge of the beam, on account of the shadow of the negative carbon and it is very low in the center. If we plot this curve of illumination we find that it takes the form shown in Fig. 6. This shows immediately how ridiculous it is to rate a searchlight in candle-powers. Depending on what part of the beam we take our measurements in we can get almost anything we want. As an ex-

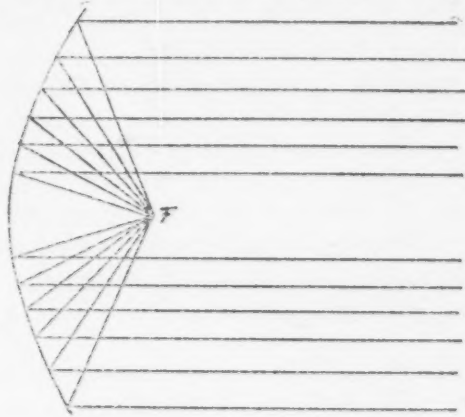
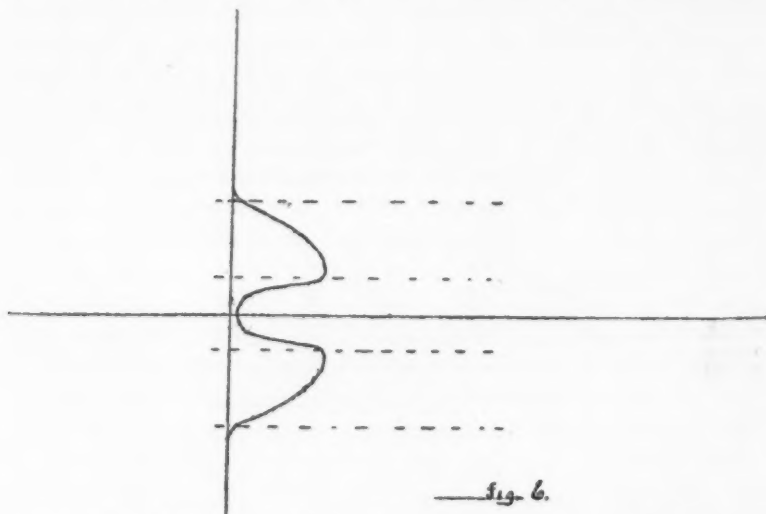


Fig. 5.

ample of how deceptive candle-power rating is, I can say that our light type of searchlight is rated by its manufacturers at 5,000 candle-power. The Edison searchlight (so-called) is rated at 750,000 candle-power and has about one-third the effective range that our light has. So far has this farce gone that one manufacturer of incandescent lamp searchlights rates his lamp at 1,500,000 candle-power. This is a 6-volt, 150-watt apparatus and has about the same range as the Edison light, but better concentration, hence the lesser current consumption. Beware of any salesman who is trying to sell projectors who starts to talk candle-powers. As soon as he mentions the subject, it is safe to assume that he is "up a tree."

There is a certain amount of stray light emitted by any search-

light, which stray light comes from the direct rays of the arc itself. This stray light is a positive disadvantage as it reveals the location of the searchlight. Looking a searchlight in the face one cannot tell whether it is one or two miles away but if one can see the vicinity of the projector it is quite easy to estimate its distance. In the older type of lamp there was provided a magnetic ring for centering the arc. This ring being a magnetic substance became magnetized when the heavy current flowing across the arc passed through it. As a consequence its magnetism repelled the arc if the arc strayed off center. It also served to hold back the direct rays of the arc and prevented a portion of the stray light getting out of the searchlight.



It is believed by many that yellow light will penetrate a fog more than white light. Of course all atmosphere reduces the intensity of the beam through absorption and by reflection due to different densities of the various strata. There is a certain amount of reflection from dust particles. Thus a searchlight beam appears as a luminous cylinder when viewed from the side. Fogs are especially troublesome and no projector of any color will penetrate one for any distance. Let us examine the claims of those who favor the yellow light. They use a golden mirror to get the yellow light. An object is yellow because it reflects the yellow waves and absorbs all others. If we are going to absorb the other light in the beam and

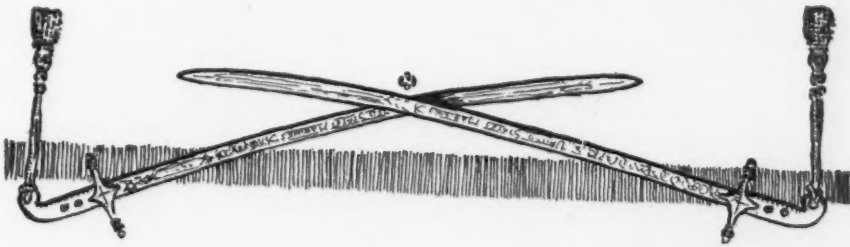
let the yellow rays pass why not use the regular mirror but put a screen on the door which will pass the yellow rays only. By using a gold mirror we have not obtained any more yellow light than the normal beam contains; we have merely eliminated the other rays. The normal beam contains just as much yellow and has the other rays in addition. If it were possible to get a light high in yellow rays we might establish the correctness or incorrectness of the theory that they penetrate fog more readily than white waves but as long as we get them by the absorption process we establish nothing. In certain cases the blue light which comes from an over-powered searchlight or from a Sperry lamp is a positive advantage. A blue object is blue because it reflects the blue waves falling upon it and absorbs all others. A battleship is painted some shade of blue depending upon the nation to which it belongs. To pick up a warship at night with a searchlight, it is of advantage to use a light which is high in blue waves. During the joint exercises with the Atlantic Fleet at Culebra, in 1914, I picked up vessels at ranges hitherto deemed beyond the capabilities of a searchlight by over-powering the lamp and turning its rays blue. I suppose that the officers with the fleet have noticed that with ordinary targets it is well to use the lamp at its rated power, but when endeavoring to get a vessel of war it is well to give the lamp more than its normal current.

Carbons used in searchlights should be kept free from moisture or steam pockets will form when the carbon gets hot resulting in the splitting off of fragments from it. This splitting results in irregularity of the positive carbon in the vicinity of the crater making a constant changing of the focus necessary. In addition this splitting will greatly increase the variation in flow of the current across the arc, which variations are too great anyway. To decrease these variations it has always been customary to place resistance in circuit. Thus with a ship's circuit of 125 volts the total resistance in circuit with a 30-inch lamp which takes 80 amperes is 1.5625 ohms. The resistance of the arc should be .6875 ohms. If the resistance of the arc falls to .65 ohms and no other resistance were in circuit, the current would be 84.6 amperes but on account of the presence of the rheostat the current is actually 81.9 amperes. It is apparent that fluctuations are cushioned and ships' lights on account of the large amount of resistance in circuit should operate very steadily.

This absorption of course is excessive. A 20 per cent drop is sufficient. A great many suppose that the rheostat is absolutely necessary but this is not so. We use no rheostats. The 1,000 feet of double conductor cable gives all the resistance we need. The rheostats are not used aboard ship so much because they are necessary for smooth action at the light as for the reason that the ship's lighting circuit is 125 volts and only 55 are needed at the lamp. With everything in perfect condition the lights can be run directly on the dynamo without other resistance in circuit providing they are supplied with the proper voltage, but it is better to have some resistance in circuit to cushion shocks although not absolutely essential. The electric companies have fostered this idea of the necessity of rheostats both because they like to manufacture them and because their principal customers are the public service corporations who like to sell current. Moving-picture projectors are now being manufactured to run direct on the line without resistance in circuit other than the projector itself and they are operating successfully. This in itself disposes of the rheostat fallacy.

In the illustrations given are shown some of our equipment. In getting up this equipment we have been guided by the requirements of advanced base work and the experience gained in the present war. Even the Coast Artillery is beginning to see the necessity of portable searchlight sets and we know that a portable lamp is worth several fixed ones both because of the fact that it can be carried to a threatened point in a short time and because it can be removed from danger instantly. Our lamps are safe from observation by the enemy's aircraft in the daytime as we remove all the sets at daylight to some point or points where they are certain never to be at night. Our generator sets are so built that they can be taken off the truck carrying them and placed anywhere upon a spot which is nearly level, and operate without the necessity of bolting them down to foundations. Their balance is such that there is no vibration at no load or full load and when used in fixed defense work they can be put in an underground casement, the cable buried and the lamp hid in the daytime. Nothing will be left to show the presence of the outfit. The enemy will never be able to drop anything on our casemate as he will have no means of knowing where it is. Some of our cable is made according to Navy Standard Specifications and some according to our own specifications. The standard cable is

for fixed defense work where it may be buried and will not often be taken off or on the reel. For portable work we use an extra flexible cable of our own which will stand constant reeling and unreeling. The cable carts are our own design and are constructed so as to permit access to both ends of the cable thus obviating the necessity of unreeling all of it to get at the bitter end. With non-reversible plugs we may attach either end to the searchlight and the other to the generator set without danger of reversing the polarity, and we may detach it in an instant. Our large lamps may be used either in fixed defense work or with field artillery; the small ones with infantry on advanced base work or on expeditions in the interior of tropical countries where a few searchlights will serve to keep the enemy at such a distance at night that the rest of the command is not disturbed by the necessity of heavy outguards.



QUANTICO BARRACKS

2D LIEUT. CHARLES PHELPS CUSHING, M. C. R.

AS train travelers on the trunk line between Washington and Richmond approach a station thirty-four miles south of the National Capital and eighty north of Richmond, they perk up and take notice nowadays of a new "point of interest" along the route—Quantico, Va., City of the Soldiers of the Sea. By daylight there is a view from the car windows of the drill grounds and the barracks of a post of 7,000 United States Marines. In the evening the 350 buildings climbing a hillside and scattered over a flat between this high ground and the nearby banks of the Potomac River are as ablaze with lights as a factory town.

Six months ago Quantico's chief "interests" were fishing and mining. The town was little more than a whistling station in the woods. When a platoon of Marine pioneers landed at the town's rickety dock from a steamboat one afternoon in the middle of May only a small field, now part of the parade grounds, was cleared; all the rest of the tract's 6,000 acres was in forest. The platoon spent the night in a deserted dancing pavilion on the river bank, and when the lunch the men carried in their haversacks was gone they had to buy up all the edibles on the shelves of the village postoffice and general store.

Though the actual work of clearing and building did not begin until well along in May, it went ahead with a rush once it got under way. In another six weeks the construction contractors had cleared upward of a hundred acres of forest, and a small city of one-story wooden barracks was open to receive a regiment of Marines which arrived to begin training for service overseas. These Marines did their part to help police the company streets of stumps and construction litter, but the heaviest of the work was complete before they arrived. Water from artesian wells in the hills was flowing in the new city's water mains, the sewage system was in operation, and telephones installed. The electric light plant was working, though the engines, as yet, had no roofs above them.

From a signal tower on the highest western hilltop the construction company took "progress pictures" every week to show the speed with which new buildings were sprouting up in the clearing. On the hillside just below this tower great blocks of quarters for the enlisted men of the infantry regiments kept creeping steadily southward. Each company was assigned to a group of six of these buildings—four for living quarters (fifty men to a "shack" 98 feet by 20), one building for a mess hall, one for a washroom.

At the foot of the hill a long, broad street—Barnett Avenue—was laid out, and as soon as sufficient quarters for the enlisted men had been completed a row of living quarters and offices for the commissioned officers began to spring up along the avenue's eastern curb line.

Then, in the center of this row, appeared a large building for the Y. M. C. A. New Britain, Conn., made this \$10,000 present to the sea soldiers of Virginia for use as a reading and writing room and entertainment hall. As part of the gift the generous New Britains included the services of reading-room attendants, physical instructors, and a teacher of French.

By the time this article sees print the Y. M. C. A. building will be part of a cantonment community center. To the east of the Y. M. C. A. will rise a structure with a floor space 110 by 232 feet, to be used either as a gymnasium or as an auditorium; seating capacity, about 3,000. In an alcove annex to this a circulating library will be installed. There is a possibility that the Knights of Columbus will soon add to the group another soldiers' clubhouse. The military postoffice is next door to the Y. M. C. A., and two public service buildings, the powerhouse and the cold storage plant are at the eastern edge of the group.

A little way east of Barnett Avenue the railway bisects the cleared land of the post. Across the tracks lies the parade ground—a "flat" of sand and clay. One of its virtues is that it drains well. An hour or two after a rain it is dry enough for drill. The artillery camp and a group of hospital buildings border the parade ground on the south, with a river making a big shining semi-circle behind them. The river bank at the eastern edge of the drill grounds drops off rather steeply, but there is a sandy beach below for swimming parties and for the tables of the clothes scrubbers. In midsummer swimming was part of the Quantico finishing school's regular course,

and it was not rare at the close of the afternoon drill period to see a thousand or more Marines splashing in the Potomac at once. All enlisted men who did not know how to swim were put through dry-land swimming drill, a "minnow school," by a physical director from the Y. M. C. A.

On a choice site beside the parade and overlooking the river is the old dancing pavilion, transformed now into an officers' clubhouse. Its floor dimensions are 40 by 80 feet; it has two fireplaces, a smoking room for the men, a dressing room for the ladies, and a small kitchen to provide buffet luncheons.

Concerning a smaller clubhouse in the immediate neighborhood the writer has no information beyond the authoritative statement that this is to be "a strictly stag affair."

Potomac Avenue, the "main street" of old-time Quantico and the "downtown section" of today, starts westward from the wharf, bounds the parade grounds on the north with restaurants, barber shops, a drug store, clothes pressing establishments, a bank, a military outfitting shop, some pool halls, and the two-story brick building which it headquarters for the post commandant and the assistant paymaster. Once this was the only brick structure in town, but the prosperity of Quantico finally took away this cherished distinction.

After Potomac Avenue crosses the railway tracks it mounts a wooded hill to a high crest which in civil war days was the site of a fort. Today nothing remains of the old defenses but a half-filled trench and a dismantled cannon. The hill is capped now with a covered reservoir and a new thirty-five-room brick hotel. A dozen bungalows dot the slopes close around. The Quantico Hotel puts on rather metropolitan airs, and boasts eight more bathrooms than the Commercial House of Tonganoxie, Kansas. The rates are metropolitan also—\$90 to \$95 a month for one person, American plan; \$155 to \$160 for two. Furthermore, you are warned to make your reservations as many months as possible in advance. The bungalows, five rooms, unfurnished, rent from \$25 to \$35 a month. Board at the hotel is \$67.50 a month.

The scarcity of quarters in Quantico has caused many officers to commute to Fredericksburg, twenty miles south. A few have even been making daily excursions to Washington. The monthly commutation rate to Fredericksburg, on a card that permits the holder

to make as many trips a day as he pleases, is \$9. The rate to Washington commuters is \$11.50 for a coupon book containing twenty-six round-trip tickets. The train schedule for Quantico fits in well with the time of the drill periods.

Each junior officer is provided quarters in the row of barracks fronting Barnett Avenue—a room furnished with an iron bedstead and a mattress, a five-drawer dresser, a washstand, a table, a chair and a steel locker. In the center of each of these barracks is a larger room for a meeting place, provided with a table, chairs, a stove, and a telephone. Back of the barracks are washrooms with hot-water showers.

In the pioneer era of life in Quantico, six months ago, there were more reasons than there are at present for wishing to join the commuters. The early settlers in the cantonment can recall the days before the hotel was opened and before feminine society came to town, the days when there was only one brick building downtown, no paved streets, no bank, no drug store, no military clothes shop, no clean restaurants. We can look at the contrast now and marvel at the transformation.

The Quantico Marines do not hesitate nowadays to match their barracks in a prize contest against any other rush-order cantonment in the land. Though it is not so large as the army's new camps, it is a model of its kind. We have 350 buildings of various types and sizes; five miles of concrete paving; a water supply from five artesian wells; two auditoriums in which to provide entertainments, which are given every week-day evening; two clubhouses for officers; a highly efficient system of lights and telephones; a model range, well screened by trees from winter winds (forty-eight rifle targets and eight pistol targets), and a miniature battlefield, with trenches, emplacements, bombproofs and camouflage, all patterned after the latest fashions in France. As for our health record, the books on that are open, too, and anyone who may have feared that this section of the Potomac valley would prove a pest hole of malaria will discover that the sanitary precautions kept malaria down to sixteen one-thousandths of one per cent.

All this has not been brought about without labor and sweat and skillful planning. The natural obstacles—forests and swamps—may have spurred the soldier citizens of Quantico to do a better

job than they would have made of it if the task to face had been easy. This, just as in the case of larger cities—Chicago, for example—built better and bigger because of the stimulus of having to fight swamps, and a Kansas City or a Seattle recruit thrives on the job of leveling down the clay banks. No doubt a good many Marines took real satisfaction in peeling off their shirts and going out to battle with the stumps in their company streets.

That "bit of Flanders in Virginia"—Quantico's miniature battlefield—is another piece of work which cost a lot of arduous labor, and which is all the more cherished accordingly. No imported engineer corps did the planning or the construction; Marines laid it out, dug it, revetted it, chopped down trees for the roofs of its bombproofs, and even put on the finishing touches of camouflage.

The students of the Officers' Training School did their "bit" in trench digging, tree chopping, and the like. From their camp at the south edge of the cantonment they trooped out two days a week to the battlefield and learned how to do by actually doing. This school is a story in itself, which may claim its just dues of space in the GAZETTE in a future issue. The present writer need do no more than record that the school set a high mark of efficiency in its first course of three months' training. A large proportion of the graduates of the first Quantico camp were students who had had previous military training, and the pace these picked men set left some of the less fortunate of us gasping for breath at the finish.

Concerning the personnel and equipment of the artillery camp, this magazine, like the rest of the press in war time, is not privileged to speak without restrictions. It is permissible to say that the approximate population of the camp is a thousand men, and that these thousand established for themselves an enviable reputation for quickness to learn their trade and for soldierly smartness. The artillery camp has one of the choicest sites in the cantonment—and has made the most of its advantages.

Down by the railway station is the big shed of the quartermaster's department (500 by 60 feet) and of the commissary (250 by 60 feet). In the same neighborhood is a garage for a fleet of thirty-five motor trucks. Business is on a big scale in this big cantonment, but the machinery has run swiftly and smoothly throughout.

No other of Uncle Sam's "outfits" can complain that the Quantico Marines have caused them a minute's delay, for the "first to fight"



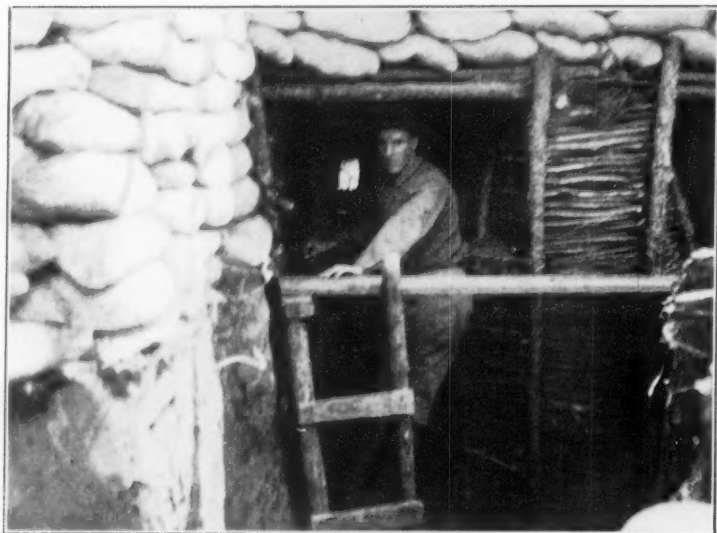
ENTRANCE TO A PLATOON COMMANDER'S DUGOUT IN THE
BOTTOM OF A TRENCH, U. S. MARINES, QUANTICO, VA.



HEAD OF A MINE, U. S. MARINES BATTLEFIELD AT QUANTICO, VA.



A BIG GABION FOR AN ISLAND TRAVERSE, U. S. MARINE
TRENCHES, QUANTICO, VA.



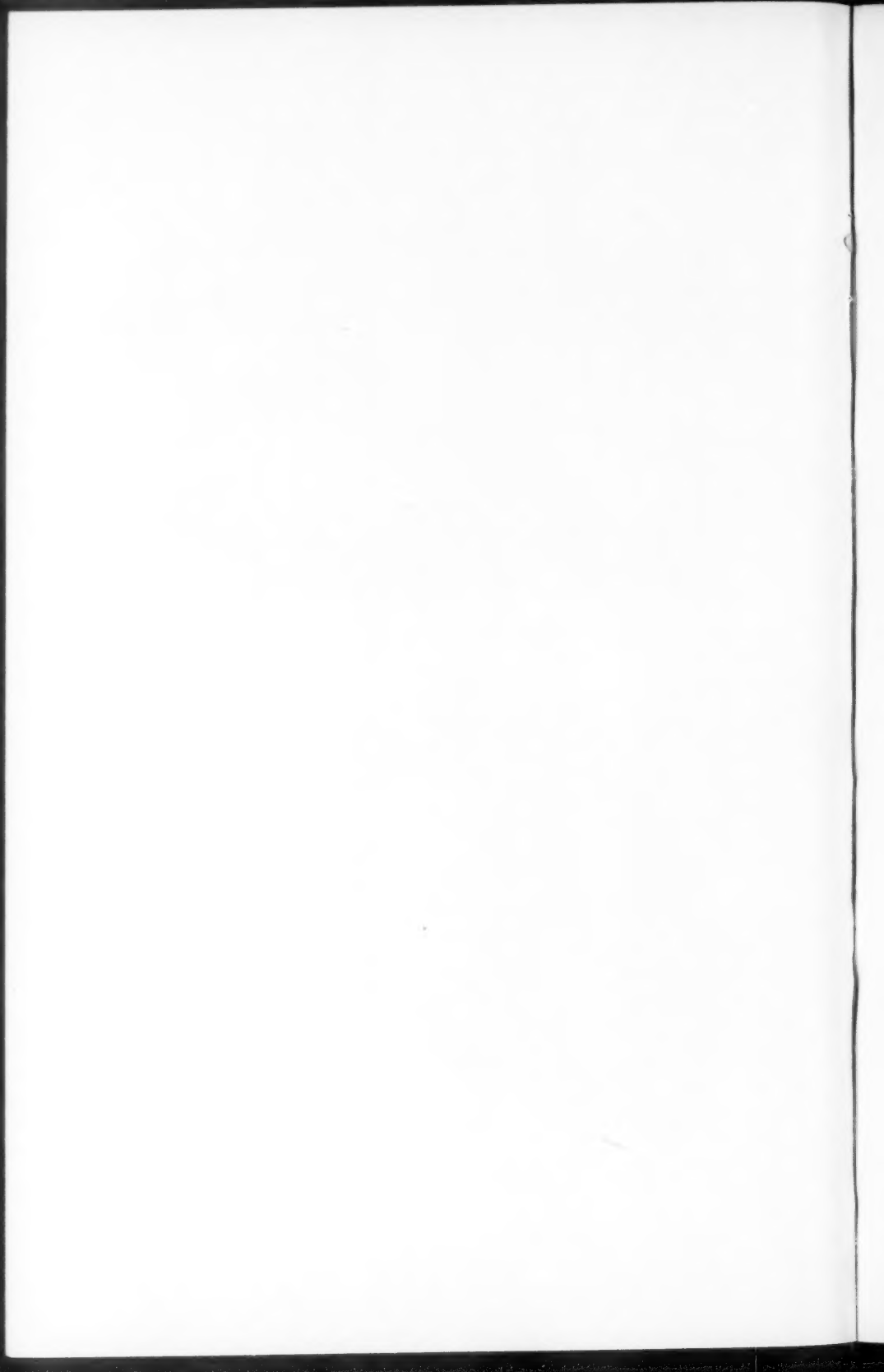
MACHINE-GUN EMBLEMENT, U. S. MARINE TRENCHES, AT
QUANTICO, VA.



LOOKING OUT OF A BOMB PROOF INTO
U. S. MARINE TRENCHES, QUANTICO,
VA.



RAPID FIRERS ON THE DOUBLE, U. S. MARINES, QUANTICO, VA.
(Lewis guns on new carriages.)



have also been the first to stand by, ready for the signal to shove off. All things considered, the team work of this, the largest of Marine encampments, has been quite as good as that of smaller units, and that is saying a good deal.

The Quantico finishing school, training for duty overseas, rounded into its present state of efficiency with the minimum loss of time. While the forests were still being mowed down and only half of the barracks had mushroomed up in the clearing, the first fighting forces arrived and began to drill. As fast as quarters were ready, more companies poured in. While dynamiters blasted stumps out of the ground and the big guns at Indian Head roared and splattered shells up and down the Potomac, the Quantico Marines were perfecting themselves in close-order drill, were learning new tricks of trench warfare, practicing new bayonet strokes on dummies in the company streets, and acquiring skill in the art of hand-grenade throwing.

Graduating classes departed for service overseas; other classes from the recruit depots took their places. The artillery camp began to set up a competition of noises against the bombardments of Indian Head and Winthrop. Strange, new tractors, something like baby "tanks," began to cavort around the cantonment; steam rollers, high-power trucks and ambulances, pop-pop motorcycles and machine-gun fusillades added to the din of many preparations to give a right royal welcome to certain representatives of the imperial German government.

We are all proud to have played a part in these preparations; and though Quantico is not yet a delight to the eye of a landscape architect, we are all a little proud of Quantico. For, above all, this city, hacked out of the forest, is distinctively ours—with the stamp of the Soldiers of the Sea upon it, a little more snug and shipshape and complete than anything else of the sort that we know about on this side of the Rocky Mountains.

NOTES ON JUNGLE WARFARE

CAPTAIN E. M. HOBDAY, 41ST DOGRAS

THE various methods of waging war with which it behooves the officer of the present day to acquaint himself may be conveniently placed under the following headings:

1. Trench Warfare.
2. Warfare in Open Country.
3. Warfare in Enclosed Country.
4. Hill Warfare.
5. Street Fighting.

In almost every case these headings may be subdivided into:

- (a) Modern Warfare Against Civilized Nations.
- (b) Savage Warfare.

Under heading number 3, Warfare in Enclosed Country, we may consider—

1. Jungle Warfare.
2. Bush Fighting.

In many works jungle warfare and bush fighting are treated synonymously. I have purposely placed them under different headings for the following reasons.

In jungle warfare proper, the nature of the terrain imposes march formations on a narrow front of long columns in file or single file, along a single line of advance. The country varies only in respect to whether its surface is flat or hilly. The power of maneuver is extremely limited. Aeroplanes are useless.

In bush warfare, the terrain varies considerably and wider formations can frequently be employed.

For example in Dahomey and Ashanti the British and French forces are described as advancing on parallel lines and adopting an elastic form of square as their normal battle formation.

Again "Small Wars," page 360, states, "It is a broad tactical rule that, in bush warfare, troops when suddenly fired into should promptly charge towards the spot whence the fire comes."

While these examples have been proved to be practicable and valuable in bush country, they would be impossible in thick jungle.

Forests of trees interspersed with cane brake, tangled with creep-

ers, based on a luxurious growth of rank vegetation under foot, such as is met with in Burma and Assam, cramp any form of extended movement, while a charge would probably land a man on his head before he could penetrate more than a few yards from the path along which the column progresses.

Aeroplanes, which have been usefully employed in scouting over the lighter bush ranges of East Africa, can see nothing in jungle country and would have far to fly to find a base.

The above form the main differences between bush and jungle warfare, and the notes compiled hereunder apply more especially to the latter as opposed to the former, and of the subheads already mentioned they fall under the category of savage warfare as opposed against civilized nations.

OBJECTIVE

Troops employed in jungle warfare will almost invariably be acting on the offensive, while the jungle tribes opposed to them will be on the defensive, which includes the power to counter-attack. The rôle of troops so employed will frequently be that of a punitive column.

The objective will be the penetration of the enemy's country, driving him back wherever met with, until his resistance is broken and he surrenders.

MEANS TO OBTAIN OBJECTIVE

It will seldom be possible to inflict a crushing defeat, as the enemy will not resist when threatened on a flank. Attention must therefore be paid to the destruction of all objects which enable him to prolong the struggle, the burning of his villages, seizure of hidden grain and live stock, and the destruction of building materials near his villages.

These steps, combined with a vigorous offensive, continually driving the enemy from his stockades and fortified positions, are the best means to attain the objective.

TERRAIN

May be mountainous, hilly, undulating or flat; but in each case covered with forests and a thick tangle of undergrowth, limiting the range of vision to a few yards. Bamboos and creepers intermingle to form a screen behind which the enemy can lurk unseen. Narrow winding footpaths may exist from village to village, neces-

sitating an advance in file or single file. On these, the approaches to their homes, the enemy may be expected to resist, and it will be necessary to advance with caution. Where these paths exist it is usually possible to utilize mule and pony transport, but in some of the mountainous districts of Assam and in the swamps of Africa only coolie transports can be used. The cutting of roads and paths is too tedious a business for a small force and should not be undertaken, unless the non-existence of previous paths or the contemplation of a long campaign by a considerable force renders it necessary.

The water supply varies with the country, but it may safely be assumed that, where there is a village, water is close by. Care should be taken to see that it has not been poisoned or polluted by the enemy.

THE ENEMY

The jungle dweller has the following advantages:

1. He knows the ground.
2. He can see where the ordinary man is blind.
3. He is swift and noiseless in the jungle.
4. He is on the defensive and can invariably secure a good line of retreat.
5. He is practically invisible.

His disadvantages lie in his being badly armed and undisciplined, the latter resulting in lack of cohesion and concerted action.

His arms probably consist of muzzle-loading rifles, bows and arrows, spears and dahs.

His method of attack is firing at close quarters from the jungle and bolting; charging with swords and spears, and sometimes attacking camps at night, though as a rule he prefers to work by day. In addition to the actual weapons of offense he may employ stone shutes and man traps.

For defense, he builds excellent stockades, protected on the flanks by smaller subsidiary stockades and in front by concealed rifle pits.

The approach to a stockade is frequently sown with panjies, large and small, while the face is often similarly decorated.

His loopholes, when they consist of bamboos as they frequently do, give a limited field of fire.

Per contra the tribesman's advantages are *our disadvantages*.

1. We do not know the ground and are forced to move cautiously over it on a very restricted front, while it is being searched.

2. Our scouts and spies are our eyes and, unless they be trained ones, we may be led into trouble.

3. The advance of a column makes a certain amount of noise, which gives the enemy warning of its approach.

4. A column becomes visible to the defender and therefore under his fire before the column is aware of the enemy's presence, unless the scouting is exceptionally good.

Our advantages consist of the possession of trained troops plus a certain amount of knowledge, culled from experience, as to the habits and customs of the enemy.

MORALE

The sudden discharge of a rifle at about twenty paces distance by an unseen foe is trying to the best trained troops; and the impossibility of being able to get at the enemy with the bayonet, plus the certainty of doing very little damage by employing rifle fire, is bound to react unfavorably on the morale of the men, particularly if the enemy's fire takes effect.

While good scouting and the employment of flankers may prevent this unpleasant mode of attack to a great extent, still, sniping will occur, and more casualties will fall to the enemy's snipers than during an attack on a stockade.

As it is usually impossible to charge, the best method will be for the unit concerned to reply briskly to the enemy's fire and then to continue the advance. Care must be taken to control fire and not waste ammunition.

The enemy rely on their stockades and if they are quickly ejected from these protections their morale is diminished, while that of the column is increased.

COLUMNS

The size of columns depends on:

1. The number and character of the enemy.
2. The work required to be performed.

The larger the column, the longer the line on the march and the greater the difficulty of protection on the move and of finding a suitable camping ground when at rest. In former operations columns have varied in strength from 200 to a brigade.

Some form of gun for breaching stockades should be included in

the column, with a few Lewis guns and hand-grenades if available. A good supply of cutting tools, preferably of the type used locally, is essential. These can be carried by the men.

SCOUTS

"Small Wars," page 351, states: "Scouting in the bush is exceptional. It is best left to irregulars on the spot, and this principle is now very generally accepted when a bush campaign is in contemplation."

It may be accepted that, unless the men have received long and special training on suitable ground, the ordinary infantry scout is practically helpless in jungle warfare.

As scouts are the eyes of the column and it is on them that the safety of the column largely rests, it is as well to consider this important question at some length.

The advantages of employing local friendlies are obvious.

Friendlies employed by a column may be divided into the following three categories, (1) spies, (2) guides, and (3) armed scouts or sepoys.

The first and second come into the province of the political or civil officer accompanying the column, and the question of their being armed and the scope of their employment will be decided by him.

Reports by spies and guides should be accepted with caution and no military precautions for the safety of the column should be omitted, because of information received from these sources.

Armed scouts are better trained than untrained and should, unless they belong to a recognized corps, be provided with a special badge by which they can be recognized.

The trained indigenous sepoy is probably the most reliable and the best material for actual scouting purposes with the column. He will probably work better in the presence of a British officer.

The jungle scout has a particularly arduous job and, as is the case in all scouting, most dangerous. Therefore clothe and arm him as best you can for the work he has to perform.

Khaki is an excellent color against certain backgrounds. In the jungle and on the side of a hill a dirty grey is considerably less conspicuous. The writer has noticed this in Burma, where the Kachin fights either in the dirtiest and most dingy colored clothes, or naked,

except for a loin cloth, smearing the body with dust and mud. On the northwest frontier also, the Pathan in his "dirt" colored clothes is far harder to detect against a hill side than a sepoy in the conventional khaki uniform. The best colors for invisibility in the jungle are a dirty grey or a combination of red and green such as is in use for shikar coats.

As regards arms, the safety of the scout will often depend on his being a good snaphooter, and a Snider loaded with slugs will be his best weapon. He must also be provided with a cutting tool for clearing jungle. His native weapon will probably be best, as it is the one to which he is accustomed, and with it he can work faster and feel more at home than with any other form of cutting tool. Scabbards on the belt are to be avoided as the handle of the weapon when not in use catches in every creeper and interferes with the man's progress.

Scouts should travel as light as possible and only the hardiest of the men should be chosen for this very arduous work.

Their instincts should not be allowed to rust in peace time. Plenty of shikar and jungle parades are a necessity to keep them up to the mark.

The employment of local tribes as scouts is by no means essential. Their use is advocated, and rightly, as the best means of outwitting the enemy at his own game, but the Indian Army contains the most excellent material, notably Gurkhas and Pathans, from which, given time, terrain, and opportunity, it is not difficult to train a most efficient body of jungle scouts.

It must be remembered that only very small portions of the column are visible to one another (frequently only ten men will be in actual sight of one another), and that therefore a great deal depends on the section commander, who must not hesitate to act on his own initiative to repel local attacks. Section commanders should act energetically in mutual support, not forgetting to send word to the column commander to inform him fully as to what is occurring. They should not be drawn away from the column, and should resume their places and pass up word as soon as their object, namely the dispersal of the enemy, is accomplished.

When firing is heard the column should be halted, the situation should be cleared up as quickly as possible, and the column should continue the advance.

It is a good plan to issue a standing order that at all halts sections will kneel and face outwards alternately, *i. e.*, No. 1 faces to the right; No. 2 to the left, and so on down the line.

Bayonets should always be fixed.

Passing verbal orders is very important, and should be frequently practiced. Situations arise so quickly that it is often impossible to issue written ones.

Scouts and advance guards can fire clearing volleys through the jungle to try to draw the enemy's fire with advantage. This has a discouraging effect on snipers, and may lead the enemy to disclose the position of a stockade before he intended to.

All ranks should realize the necessity of keeping absolute silence, and their eyes and ears always open.

Strict march discipline is essential. A man must never fall out for purposes of nature unattended. There should be no smoking on the line of march; the column should keep well closed up.

The rear guard must watch the rear as well as their flanks.

The best position for the officer commanding is in front of the guns.

ENTERING A VILLAGE

Send flank sections round outside the village on both flanks, and extend your point.

Place your guns and Lewis guns where they can give covering fire.

Advance your point by short rushes letting your flankers keep ahead.

Extend your sections in rear as they come up, reinforcing your flank sections till the advance guard arrives at the far end of the village and you have surrounded it.

Detail parties to search each house, and to look for hidden grain. This will probably be found concealed in the jungle or in hollow bamboos concealed in trees.

If the village is to be burnt, decide whether it will be used as a camping ground at any time. If so, postpone the burning till the ground is no longer required. Ashes are dirty to camp on. Camping grounds are scarce.

If you have to pass through the village, get the whole column through before you start burning operations. The rear guard is responsible for the safety of the men detailed to set fire to the village.

CAMPS

The principles as regards camps are laid down in Field Service Regulations.

Enter your camping ground as if it were a village, so that all-round protection is secured at once.

Halt main body and transport till ground is cleared. Detail clearing party to get to work at once and post pickets while ground is being cleared.

As soon as ground is cleared, march main body and transport to their allotted places, and start entrenching.

During day time station pickets over water, and far enough out to permit grazing or drivers to cut fodder.

At night have all pickets inside the perimeter if possible. If a detached pickets is necessary at night it must be strong enough to be self-supporting, and must take up its position in time to allow for entrenching before dark.

TRANSPORTS

Transport in Burma consists mainly of hired mules with Chinese drivers. Each man owns a certain number of mules which are driven instead of being led, and each man likes to keep his own mules together, which complicates loading, as the number of mules in one or two droves seldom corresponds to the number required to carry certain articles. Therefore be firm on the first day's march, and insist on mules carrying loads detailed to them.

Saddles are constructed so that the load is tied on before saddling up. The saddle with load is then placed on the mule. Loading is best left to Chinamen. When halted, saddles with loads should be stacked near the quarter guard. Do not untie more loads than is absolutely necessary. The fewer loads to tie, the quicker the start in the morning.

Insist on punctuality in starting on leaving camp. If Chinamen are found cooking their breakfasts at the starting hour use a thick stick. It will save endless trouble. In other respects Chinamen are excellent men, hard workers, cheery, and absolutely fearless.

A certain number of mules must be left spare for the drivers' use.

Coolie transport is a speciality. See official report on the Abor expedition.

CASUALTIES

When casualties occur off the road, have them brought to the doctor. Don't allow the doctor to go into the jungle. He will probably be shot if he does so, and there is only one of him.

Utilize friendlies to carry the wounded, and make bamboo stretchers. They will do this for a nominal wage, and also help to clear the jungle for a camping ground. Employing them on these duties economizes men and material.

NIGHT OPERATIONS

Are almost impossible in jungle warfare. Without a moon the nature of the ground is an almost insuperable obstacle. With a moon the chances are that your advance will be discovered before anything can be accomplished.

Instances have occurred where a few of the enemy have been surrounded by a small force acting at night, but good guides and trained troops are essential, a combination not often procurable.

RUSES DE GUERRE

Small shikar parties sent into the jungle will discourage snipers. Care should be taken that they do not stalk one another.

Marching through a village, and leaving small parties concealed round it till the villagers return has been successful in accounting for some of the enemy, but jungle tribes are very wary, and picked men with some knowledge of the jungle are required to carry out this ruse successfully.

For every armed man there are ten unarmed watchers who note the movements of the column, and inform their fighting men. It is very difficult, therefore, to surprise the enemy.

CONCLUSION

The above notes have been jotted down at odd moments whenever the writer has had a little leisure.

They leave a good deal to be desired in arrangement and completeness, but if they prove of interest to any officer wishing to study this particular form of warfare, they have not been compiled in vain.

The subject is not the less interesting in that no really successful method has as yet been formulated by the employment of which a crushing defeat can be inflicted on jungle tribes, *i. e.*, on their personnel.

FORMATIONS

The general principles governing march formations are laid down in Field Service Regulations, secs. 149 *et seq.* Where a column is forced to proceed in single file along a narrow winding footpath, it is of course vulnerable along its entire length. Flankers and an adequate guard to protect the baggage must therefore be detailed. Flankers should never be far from the column and should work in pairs.

The tactical unit must be a small one, in order to deal with local attacks quickly and efficiently.

The Burma Military Police posses a paper-covered book entitled, "Jungle Warfare." This work consists of about 40 pages and contains a complete system of drill for formations in the jungle. On page 2, it states that "The company commander . . . proceeds to tell off his company into sections of five files with two noncommissioned officers to each section."

These sections are tactical units, and the object of having two noncommissioned officers is to have one at the head and one in rear of each section when in single file. Under the present company system the section would suffice as the tactical unit.

The advance guard consists, as laid down in Field Service Regulations, of a point (one section), and flankers (two sections, one on either flank), who maintain connection with one another by means of signals blown on the whistle. The point commander is usually responsible that communication is kept up with the flankers. The whole of this party should be composed of scouts. Flankers should work ahead of the point, otherwise the point will be sniped. The point commander sets the pace for the column.

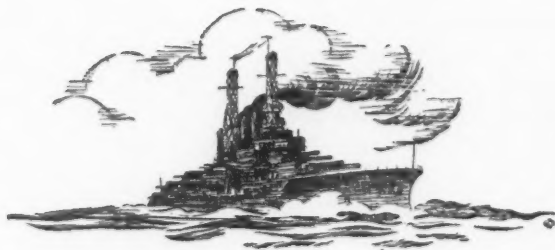
ORDER OF MARCH

A convenient order of march for the main body is to detail three sections to follow immediately behind the advance guard. No. 1 section reinforces to the front, No. 2 section to the right flank and No. 3 to the left flank, then the guns with escort followed by the remainder of the main body. Sections should be numbered consecutively from front to rear throughout the column. Immediately in rear of the guns there should be at least one mule with entrenching tools and one mule with small arm ammunition. The path will need improving frequently before gun mules can pass over it, stock-

ades will have to be demolished and obstacles removed. The fighting force is really the head of the column and it may be difficult to bring up ammunition from the rear of the column.

FIRING AND LINE OF MARCH

When operating in hilly country and the path winds, fire to a flank must be well controlled, otherwise one part of the column will be firing at their own men in the column, through the jungle across a nullah without knowing it. Men should be trained to advance to the edge of the path and fire up or down hill as the case may be. There is a great tendency to get back and fire across the path which must be stopped at once, as this means waste of ammunition and renders communication by means of messengers impossible.



SERVICE IN GUAM

CAPTAIN H. K. PICKET, U. S. M. C.

AS MANY young officers are entering our service who are unfamiliar with the conditions obtaining at any of our foreign stations, we should try to promote the idea advanced by Captain Coyle in his article, "Service in Haiti," published in the December number of the GAZETTE. While an article, based on such commonplaces as the roads and weather, may seem most uninteresting to one preparing it, it may prove of value and interest to others to know how these things effect the everyday life in some particular place.

So far as Marines are concerned, Guam has been on the map since 1898, but only a small percentage of us have seen it except on transport day, and a few of us are still putting foreign postage on our letters from the States. So few officers come to Guam prepared for the conditions found here that the authorities have taken the matter up, and an effort has been made to have a circular of information furnished each officer and Government employee ordered here. This will serve its purpose, but, as only those who are ordered to Guam are furnished this circular, the following, which is taken largely from it, is advanced for the service at large.

LOCATION OF STATIONS

The naval government and officials are located in Agana, the capital city. Here are also the offices of the commandant, the commanding officer of Marines, the headquarters detachment and band, and the 40th company. The rifle range is at Asan, and the 41st and 42d companies are at Sumay. Sumay is twelve and one-half miles from Agana; Piti, the harbor landing, is five miles from Agana, and seven and one-half miles by land, and three miles by water from Sumay; Asan is three miles from Agana on the Piti road.

QUARTERS

The only public quarters available are those for the governor, the commanding officer of marines, and the beachmaster at Piti.

All other officers, except a few bachelors, who live at the Officers' Club, must live in native-owned houses. These houses are usually built of native concrete with walls from 12 to 18 inches thick, and covered with tiles or galvanized iron. They are generally small, consisting of one or two bedrooms, one dining and living room, a kitchen and a bathroom. The chances of securing a house that has been converted, become better as the station grows larger, and more houses are made over, but it has been found that natives themselves are apt to want to occupy a house after it has been improved. By that is meant the installation of water, toilet arrangements, and electricity for Agana. The other stations have no electric lights. These improvements cost from \$100 to \$250, and the expense is deducted from the rent.

There are no hotels or boarding houses in Guam, and, as houses are small, it is impossible to find accommodations, except meals, for more than a few days. For this reason officers should write or cable to the post quartermaster (cable address: *Marcopost Guam*); or in the case of naval officers, to the supply officer (cable address: *Navsta Guam*), stating the number of rooms needed. These officers are always glad to do all they can toward securing a house, it being understood that they will not advance the money necessary to convert a house without specific authority. Rents average about \$25 per month.

FURNITURE

Do not come to Guam expecting to equip yourself after arrival. My advice to newcomers is to buy your whole outfit, have it carefully packed, and personally see that it is put aboard the transport. This, however, does not apply to wicker furniture which can be bought in the Orient and shipped to Guam by the Supply. In selecting your furniture, do not buy veneered or any fine pieces. Valuable books and pictures are apt to be ruined by dampness and cockroaches.

All china, glass, and kitchenwares should be brought with you. Bringing one's silverware is a matter of individual taste. A majority of the families here now have their silver. Some say that it has been injured, others say that it has not. A great deal depends upon the care it receives.

As household goods are so easily disposed of at fair prices, it is

urgently recommended that families bring only such articles as they are willing to sell when detached.

Captains of the Marine Corps can secure from the post quartermaster a dining-room set, one bureau, one chiffonier, and two suali screens.

Fuel is furnished in kind. Coal or oil-burning stoves are used entirely. If you wish to bring any electrical appliances, see that they are wound for 250 volts.

CLOTHING

Summer clothing is worn the entire year. White duck and khaki cloth may be obtained, but there are no first-class tailors on the island. Women should make arrangements with some reputable house for shipping such articles as shoes, corsets, hats, laces, etc. While these articles are obtainable here, they are of a most inferior quality, and the prices are high. Washable silks will stand, but chiffon or other fabrics of this class rot very quickly.

Bring a pair of colored glasses. The roads are white, and the glare is very severe on newcomers.

SERVANTS

Cooks are scarce, and only fairly efficient. Of these the Chamorro (native), is less desirable than the Chinese, Japanese, or the Filipino. House boys are easy to get, but hard to train. Wages run about as follows:

Cooks	\$15.00 to \$30.00
Boys	5.00 to 10.00
Nurses	3.00 to 6.00
Laundresses about \$2.50 per member of family.	

MARKETING AND SHOPPING

About all the retailers are supplied by the two wholesale houses here, and they carry practically the same lines. With one or two exceptions, little attention is paid to the wants of Americans, and in those cases the quality of the goods is inferior and the prices high.

There is little marketing as we use the word. The island produces many fruits and vegetables that are in constant demand, but the average rancher is thriftless, and will not go to the trouble of placing his products on the market. An effort has been made to

encourage the natives to sell their produce, and a place has been set aside on certain days for marketing, but cooperation is not a characteristic of the Chamorro, and the results are still doubtful.

The best way to buy from the native is to go to his ranch, take what you want, and pay him in other products. He likes canned goods. In this way it is easy to obtain alligator pears, mangoes, papayas, oranges, bananas, pineapples, lemons, limes, breadfruit, coffee, eggs, chickens, ducks, turkeys, pigs, fish and occasionally fresh venison. About three crops of corn are raised yearly, and it is seldom that string beans, cucumbers, okra, and eggplant cannot be had from the government garden.

Commissaries are received monthly, and there is always a very good assortment of fresh meats and canned goods. Fresh vegetables such as celery, cauliflower, etc., are obtainable only about one week after the transport arrives. Fresh milk is not obtainable.

ROADS AND VEHICLES

All the principal points on the island are connected by government roads which are kept in very good repair. Some sort of motor vehicle is almost a necessity. The Ford is the only automobile having an agency here where it is possible to obtain spare parts without a delay of three months or the expense of cabling. Several officers have motorcycles, and some have side cars attached. The cost and upkeep of these are not so much as that for an automobile, but the latter is more satisfactory during the rainy season.

Officers should arrange transportation for their machines by army transport or naval collier. The rate via commercial schooner is exorbitant, and the service slow. Bring an extra set of tires, some inner tubes, and chains for rear wheels. The roads are very slippery when wet.

CLIMATE

The island is so small that sea breezes are not interfered with, and there are no hot land breezes, regardless of the direction of the wind. The northeast trades blow almost continually, and it is never uncomfortable where there is a breeze. The nights are cool, requiring light covering most of the year round.

The dry and wet seasons are all that their names imply. During the dry season, beginning about December and ending in June, there are only occasional showers, the roads are dry and dusty, the grasses

dry up, and there is sometimes a scarcity of water for general use.

This, however, is remedied by the beginning of the wet season, and the change brings such a contrast as does the melting of the snows and the budding of the trees in springtime at home.

Although there is not a great variation between the average minimum and maximum temperatures, 76° to 86°, the rainy season is cooler and generally more pleasant than the dry.

SCHOOLS

There are no schools that children of grammar school age can attend. Several private schools have been started and run at a moderate cost to the patrons, but whether or not there are schools is merely accidental.

MAILS

The only regular mail service for Guam is by the army transports that leave the States on the 5th and arrive here about the 28th, monthly. Mails leaving here then arrive in the United States about six weeks later.

READING MATTER

The John Rothschild Library (public), and the Post Library have a very good selection of standard, as well as the latest books of fiction, and both are available for the use of the people of the colony. The company reading rooms and the Officers' Club are supplied with the leading magazines, but it is advisable to subscribe to enough reading matter for the home.

CABLES

Guam is in direct cable communication with San Francisco, Honolulu, Manila, and Yokohama, and the service is satisfactory at all times. As cable tolls are very high, in comparison with land line telegraph rates, it is imperative to use code wherever possible. The principal commercial codes in use in the States are available here, but, as they are unsatisfactory for family use, one should provide himself with one of the small codes now on the market, and register code addresses before leaving home.

AMUSEMENTS

A great deal has been accomplished in the way of increasing the facilities for amusements that contribute toward the health and contentment of the colony. A baseball league has been organized,

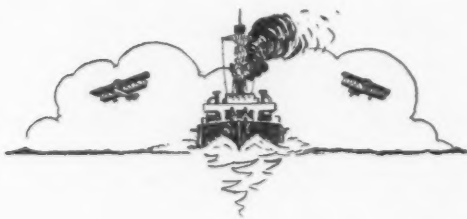
and the six teams battle annually for the championship and Maxwell pennant. The natives take well to the game, and a team composed of them now holds the honors.

There are two tennis clubs. One is in Agana, and the other at the Cable Station in Sumay. Rivalry between the two clubs is being stimulated, and frequent matches are being played. Both of these clubs are great assets to Guam life, and are maintained at a small cost to the members. Bring your racket and an extra set of tropical gut with you.

There are two places for swimming. One of them is provided with an excellent house for camping parties and beach picnics. Ladies should bring more than one bathing cap as rubber will not last in this climate.

There are two very good bands on the station, and from two to three concerts are given on the plaza daily. Dances are given twice monthly by the Officers Dance Club, and transport day is the occasion for much festivity.

The above is contributed only to give a general idea of what Guam life is like, and no attempt will be made to tell you what, or what not, to do to be contented here. That depends entirely upon the individual. Do not make up your mind that you will not like the place; you may be forced to change it as others have.



HOW THE WAR WILL BE WON

MAJOR CARLO UMBERTO CATTAPANI

Late Chief of Staff of the Second Division of Montenegrin Army

The following is a copy of a lecture delivered by Maj. Carlo Umberto Cattapani, late Chief of Staff of the Second Division of the Army of Montenegro, at Marine Barracks, Quantico, Virginia, last summer. Major Cattapani was educated and trained in the Italian Army for a period of seven years. He took part in the Albanian revolt against Turkey in 1910, and was a war correspondent and an informer in the enemy's territory in the Italian war against Turkey in 1911. He also took part in the first Balkan war. He was promoted to major on the battlefield, and proposed the plan for the final assault on Scutari, which was successful and for which he received many honors. He is an educator, an artist, and a well-known lecturer in Italy. At present he is a commissioner of the Boy Scouts of Italy, and has received many decorations in his own country. He is an active member of the Royal Italian Geography Society, of which he has been an official lecturer on several occasions. He has lectured at West Point, clubs, and other institutions. He will soon return to duty with troops in Europe.—EDITOR.

OFFICERS of the glorious army of a nation which has never known defeat, I thank you in advance for the honor you have done me in requesting my presence here today in order that I should speak to you about the war.

Disclaiming any pretension to oratorical efforts, I will try to do my best in bringing home to you a few facts, which, though well known to military men in Europe, have not yet received in America due attention, both from the general public and the ruling powers.

The title of my lecture may give you the impression that I am posing as a prophet or that I may possibly be in a position, by inside information, to foretell what is going to happen in the world in the near future. Both hypotheses are wrong. I am speaking as a military man and as a close student of past events, with some knowledge of modern warfare and of the several fields where the armies of the belligerents are fighting.

I will tell you of facts and concern myself with military matters; I will only incidentally dwell on the political and social and economical side of this great human tragedy, but I will not enter in a discussion of them. We are soldiers; our business is to fight and to win, and we cannot take into account factors which are out of our province. If, by unforeseen circumstances, or if by the will of God, events are precipitated and victory or defeat comes to us, our conscience will be at peace, because we will have done our full duty,

but on no account can we be pacifists or let up on our preparations. We cannot indulge in idle talks while the world is aflame, or base our hopes on factors which are not of military nature. We have to deal with a powerful enemy, who is ever ready to crush us, who does not believe in the sanctity of treaties or in the Christian civilization of two thousand years; so we cannot take chances.

THE GENERAL MILITARY SITUATION

At the beginning of the fourth year of war we find two-thirds of the world combined against Germany and its allies, our enemies. Till now they have been victorious in some section of the various fields of battles, but what has Germany gained, and what is the balance sheet of her profits? . . .

She has conquered about 200,000 square miles of foreign territories, but she has lost 1,000,000 square miles of prosperous colonies. She has enslaved Belgium, Poland, Serbia, part of Roumania, but she has sacrificed 2,000,000 of the flower of her manhood, at a cost of \$20,000,000,000, and has acquired the hatred of all the civilized world. If Germany calls this success, she is deluding herself, because the powerful military machine of the Allies is ready to strike thousands more blows, more intense in force and efficiency as the time passes, backed up by the democracies of the world, who are realizing their danger from the Prussian autocracy.

It is a remarkable fact that not a single democracy is on the side of the central empires. Our foes are led by four autocrats, ruling by force of arms, supported by the combined interest of caste, over a people prepared for this onslaught on peaceful humanity by a half century's training to the worship of the gods of war. This I want to bring to your attention, young men of America—you who are going to lead the sons of this great republic on the battlefields of Europe, the land of your forefathers.

GERMANY IS WINNING, BUT SHE IS LOST

This sentence may seem a paradox, but, nevertheless, is the expression of the plain truth. Napoleon the First at Moscow was a conqueror, but his victory was the beginning of his doom. In different ways history repeats itself, and the Kaiser and his clique cannot escape the fate of the great French emperor. On the western front British, Belgium, French, and American armies face the Germans along the whole front, from the North Sea to Switzerland.

I cannot give you the figures, but I am not far from the truth in stating that possibly 4,000,000 German soldiers are there, strongly intrenched, checked by the Allies, who are steadily pressing forward slowly, but constantly hammering at their foes, who have lost the power of initiative. On the eastern front the debacle of the Russian Empire has given Hindenburg a free hand, and the conquest of Riga, with the probable fall of St. Petersburg, will give the Teutons a false sense of security and undoubtedly will strengthen the position of their government at home. Their authority is tottering, but is not by any means losing the grip on the masses of the people. Their armies must be constantly in action to divert the attention from the economical conditions, which must be bad, but not so desperate as some reports want us to believe. All these victories against disorganized enemies are magnified for home consumption, and we may be sure that, following its system, the German general staff will turn its attention in the near future to the Balkans again or to the Italian front, which is eating constantly into Austrian territory, and to date is the only one where the Central Powers have not reaped any success. Cadorna has countless numbers of men, but needs help in heavy guns, which he expects to receive at any time from England and France. Germany knows of this, and we must not be surprised if the next thrust will be delivered on the Alps, which, once crossed by our men, will leave open the road to Vienna and to the south of Germany, as I will show later on.

But even with further success she cannot win. The fate of autocracy was sealed on the day that the American flag appeared on the battlefield of France, and it is to be hoped that its effects will be felt all over the fighting lines in every latitude against all enemies who are the foes of humanity. The defense of these rights the United States has generously and valiantly shouldered in the moment of need.

THE REASON OF THIS OPTIMISTIC VIEW

The vital spots of Germany are in the west and south on the boundary line of Austria. On the west proper she is well protected, but in the south she has no formidable line of defense, as on the Rhine. On all other fronts, except in Russia, the Central Powers are hard pressed. They are only advancing to date where there is little or no opposition. This gives us the measure of the strength of Germany's armies today. Austria, the big partner, has her hands

full with Italy and cannot spare a soldier, because in the coming year she will need all her powers to stem the tide of Italian invasion, which will open the way to ultimate victory.

GERMANY WILL BE CONQUERED FROM THE SOUTH

The western front extends from the North Sea to the Swiss frontier, and the contending armies have faced each other in the last two years, shifting their positions back and forth, few miles at a time, except in the last few months, when the British, the Belgians, and the French, in the northern sector of their line, have succeeded in constantly pushing back the Germans.

The French hold the beginning of the line of trenches from the sea, extending through Nieuport for a few miles, and they enclose the Belgian sector of about 25 miles on the Yser, and after a few more miles of French soldiers come the British; then the French again, with two divisions of Russians, in the Champagne sector, and the Americans, which have not yet taken their position, but which probably will be near the British.

Now, on this front, since the second struggle around Verdun (which lasted 130 days and which ended on the last day of June, 1916, with the defeat of the Crown Prince and the dismissal of General Von Falkenhayn, the originator of the scheme of attack) there has not been any action of any great magnitude. The Germans, more for political than tactical or strategical reasons, wasted their energies against this sacred shrine of the French Army and failed before the splendid and supreme sacrifice of the sons of France, who died by the tens of thousands with unyielding fortitude and unparalleled bravery.

Verdun represents the supreme effort of the Teutons, who wasted the bulk of Germany's strategical reserves. This battle, which is the greatest single action of this campaign, was followed by desultory fighting on the hills of Picardy, and the activities of the armies afterwards became more pronounced on the Somme and the Yser. But the violence of the German offensive since the days of Verdun has waned. They have lost the power of initiative and are constantly pressed by the Allies. But the Germans have not been defeated yet. They still hold nearly the whole of Belgium and part of France, and before the Allies can push them back to the Rhine they will have to overcome several lines of defenses which

can be easily held against overwhelming odds by the depleted German ranks.

THE RHINE

We are not in a position to tell exactly what defenses the Kaiser has prepared between the present line held by his armies and that at the Rhine, but observations made by airplanes and information recently received by different sources are in concord in saying that long lines of mile-deep trenches and other warlike works will form a most formidable obstacle in the way of the advance of our own troops on the day of the forward movement.

As to the strength of the opposition that we will encounter on the ground conquered by Germany stands the sure knowledge that we have the most formidable combinations of fortifications just before and all along the river Rhine, complemented by the defenses of Antwerp, Maestricht and Metz, which are the huge outposts of the permanent line of defense of the German Empire, prepared for half a century by the skill of its general staff, the heir of the genius of Moltke.

If you look at the map, you will see the peculiar and formidable position of fortified posts on the tract of territory opposed to the Belfort, Espinel, Verdun, and Ypres, which forms, in a rough way, a kind of parallelogram, whose two longest sides are formed by Cologne, Coblenz, and Mainz, on the Rhine, and Strasburg, on the same river, Metz on the Moselle, Namur on the Meuse, and Antwerp on the Scheldt, with these streams forming most favorable lines of communication between the two sides of this huge entrenched camp.

To attack and overcome this system of defense, it will not be sufficient to have an army in the proportion of two to one to the defending force. We have already seen the futility of such action with the same elements of attack and defense in the case of Verdun, so we are sure that the same situations will confront the Allies as Germany found at Verdun, at the Somme, at Ypres, and Yser on her march to Paris.

The Allies, to crush their foes and push on to Berlin, will have to possess a force of two and a half to one to break through the Rhine. Till today and for some time to come the two opposing forces on the western front are and will be in a condition of apparent stagnation. This condition has been immensely useful to the Allies,

who have everything to gain by the lapse of time, while Germany, hard pressed and hemmed in by the blockade by her enemies, is interested in a speedy decision of the war.

But we must not rely too much on the internal condition of our enemies, and we must discount all news about them, purposely spread to allure us to a false sense of security. Now, to conquer Germany we must defeat its armies on the western front and follow our victory with a quick advance, so as not to leave to the foe time to reorganize and prolong the struggle. The Teutons' forces confronting ours on the western front are about 4,000,000 men. To them we must have 10,000,000 to oppose and a proper proportion of artillery of heavy caliber. Now, it is evident that we cannot muster such a huge force there before a couple of years at least if America will supply by that time 3,000,000 men.

But we may not need to concentrate on the western front such a huge army if we are able to threaten Germany from the south and compel her to withdraw part of her armies, thus weakening the defense on the west and permitting in a year, with the force then at our disposal, to break through the Rhine. In such a case, in my opinion, 2,000,000 American soldiers will be sufficient, if, however, 30,000 airplanes will be ready in a year from now. To do all this, your nation will have to call to the colors 4,000,000 men to keep its contingent in Europe to the highest pitch of fighting efficiency.

But we will not need such a stupendous effort if we will be convinced and give due consideration to the strategical importance of the Italian front, through which it will be possible to eliminate one of the big partners of Germany by attacking her successfully from the south. This will be possible if the Allies in general, and America in particular, will give all their cooperation to General Cadorna, who, in spite of great odds, has successfully repelled the armies of Austria. But just at present the crumbling down of the power of Russia will increase the difficulties of Italy, which will soon have on her hands the whole Austrian forces, probably reinforced by the insistent requested German divisions freed from the Russian front.

THE ITALIAN FRONT

Now, gentlemen, you must forget that I am an Italian, and I shall try to subdue my natural pride in relating the accomplishments

of my own country. I will give you figures and facts. On them I will base my theory that victory to all will come through us if we are helped before the Germans mass all their energies against us and attempt to do to us what they have succeeded in doing to Russia and Roumania. The Allies must listen to the points of view of our military men and statesmen, who to date have proved themselves to be in the right.

Now, please remember well these facts: Italy is holding a front longer than the French, British and Belgians combined; its length, when fully developed, is 450 miles. Italy to date is fighting on the enemy's soil. She has never changed her commander-in-chief and the unity of her action has never been broken. Her line of trenches, mostly built in solid rocks, extends for many hundreds of miles. She has been fighting for nine months of the year in fields of ice and snow, sometimes at an altitude of 9,000 feet. Nearly a quarter of a million of her men have been waging war for two years, always above 6,000 feet, in constant glacial regions, where she has taken 8-inch guns mounted on ice sleds, two miles above sea level. The Austrians at the declaration of war were in possession of all the high peaks and passes, strongly fortified for the last forty years, while Italian soldiers had to climb from the lowlands, where my country was prevented from building railroads, or any kind of roads, or other means of communication for strategical or tactical purposes. Wherever such a work was undertaken our former ally, Austria, objected on the ground of the unfriendly character of such an enterprise.

The divisions of Italy have been fighting from positions which sometimes can be reached only by baskets slung from sagging wires and amongst arctic surroundings, or have been advancing on the sun-scorched floor of the Corso, without a drop of water, while in the lowlands of the Isonzo the soldiers have been in the water to their waists. One million highly efficient trained troops of Austria have been busy on their mountain stronghold contesting the advance of the Italians, who have successfully dislodged them from one position after another.

That million would have been sufficient if employed on the western front to turn the scale in favor of the Central Powers. Italy has today 4,000,000 men, of whom 2,000,000 are actually engaged on the battle line. These facts about Italy are not generally known,

and it is my duty to my country and to yours to call your attention to these remarkable achievements, not for an empty satisfaction of racial pride, but for the purpose of strengthening your confidence in a country which will open the door to Berlin the moment she will have the full cooperation and understanding from her Allies in general and from America in particular.

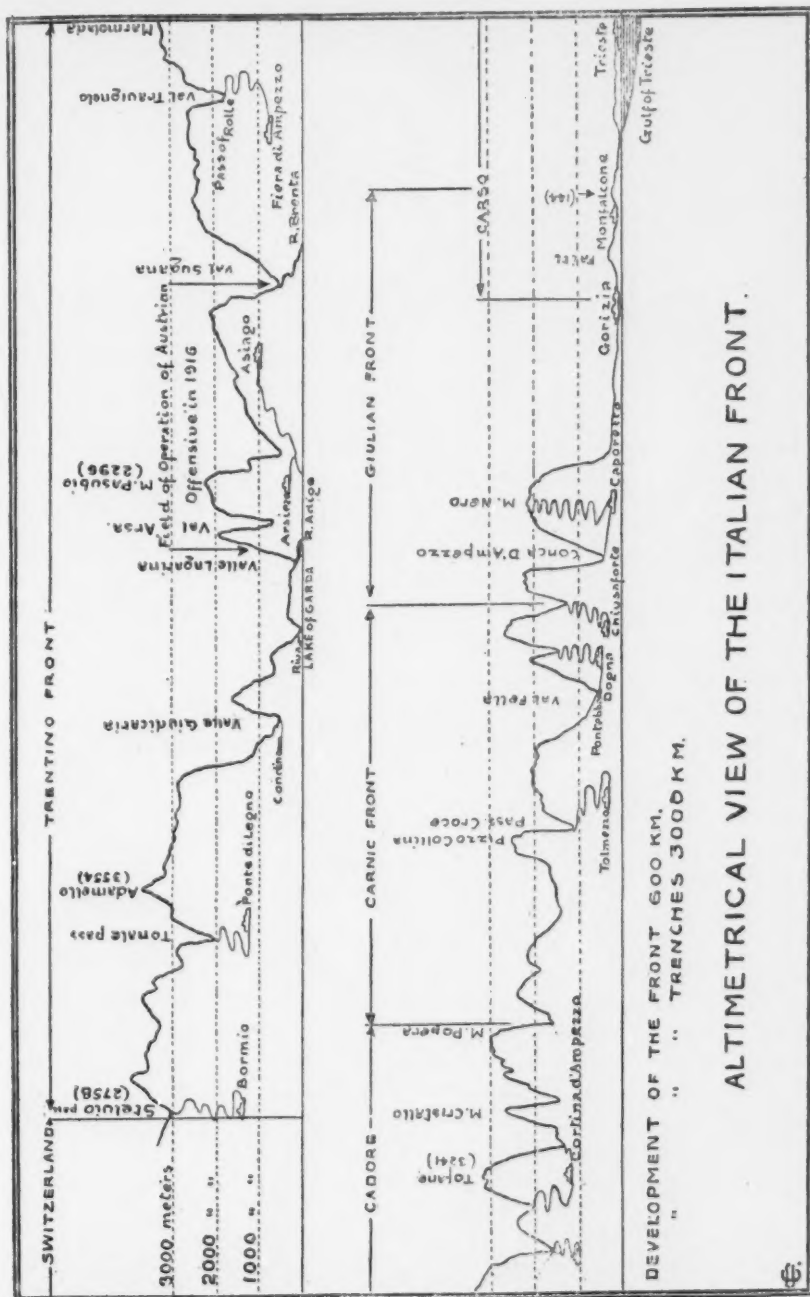
This altimetrical map of the Italian battle front will convince you more than will any verbal description what difficulties Italy had to encounter in facing the Austrians. You can see that from the Pass of the Stelvio, near the Swiss-Austro-Italian frontier, to Monte Nero, on the sector of Gorizia, there is a succession of formidable bulwarks, which have given to our enemies as many natural fortresses, which only lacked the guns that our foes have mounted on them in the long time of peace. But this map cannot tell you entirely the difficulties which confronted the Italian general staff. Her main thrust was only across the Isonzo River, with the city of Gorizia, commanding its passage and forming, with 60 miles of flanking positions, a formidable entrenched camp, defended by 200,000 troops. To the north and south this river is dominated by long ranges of horseshoe-shaped mountains. On the left of this main line of operations lay the ominous salient of the Trentino, which runs down into the plans of Lombardy, offering hundreds of starting points of assault upon the rear of the Italians.

From the strategical and tactical point of view, the Italian line of battle is the worst of all the fields of this campaign. The only part of this front, as you can see, which does not surpass in height 1,000 feet is that to the south of Gorizia, formed by the Carso—the terrible Carso—where thousands upon thousands of the best men of Italy have been slain, and where have been written in the past year hundreds of pages of heroic deeds and of unparalleled bravery.

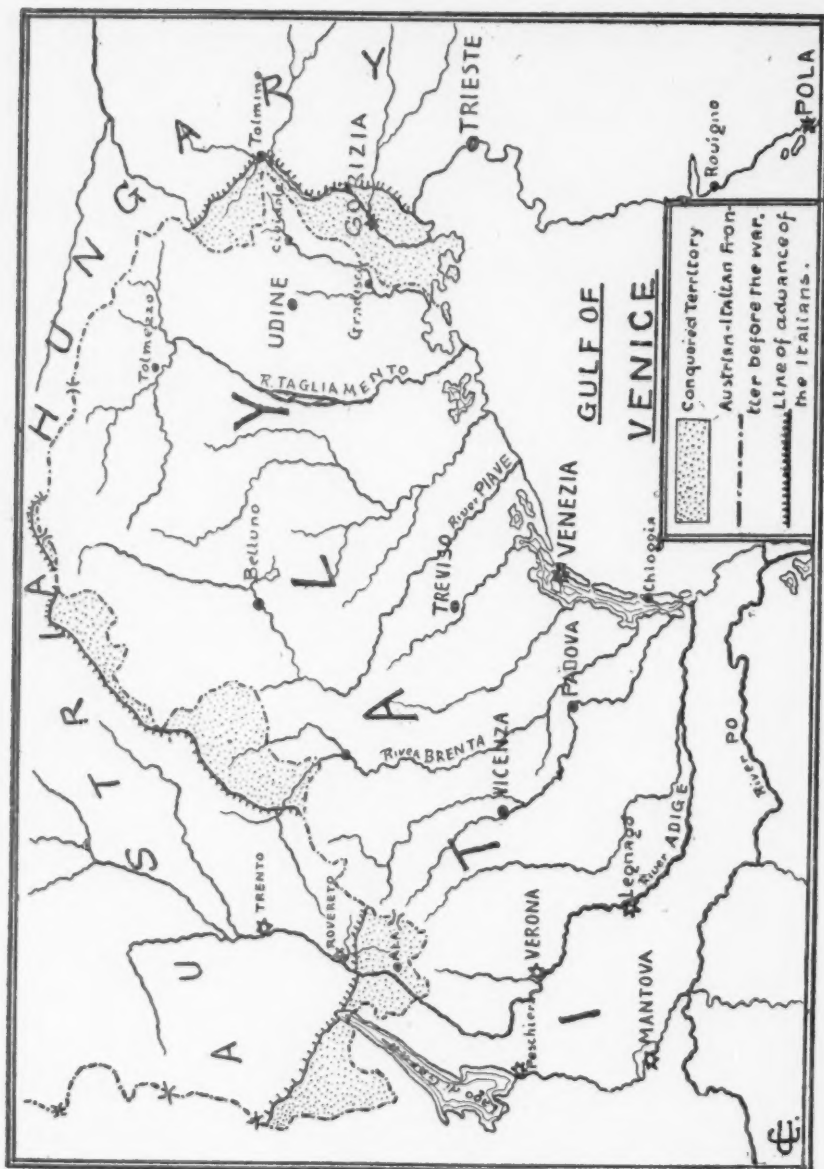
I cannot better describe to you this great battlefield than with the words of the official publication of the Italian general headquarters. This has been found by the many foreign correspondents and writers to be the only one that gives a passably fair idea of what this plateau looks like.

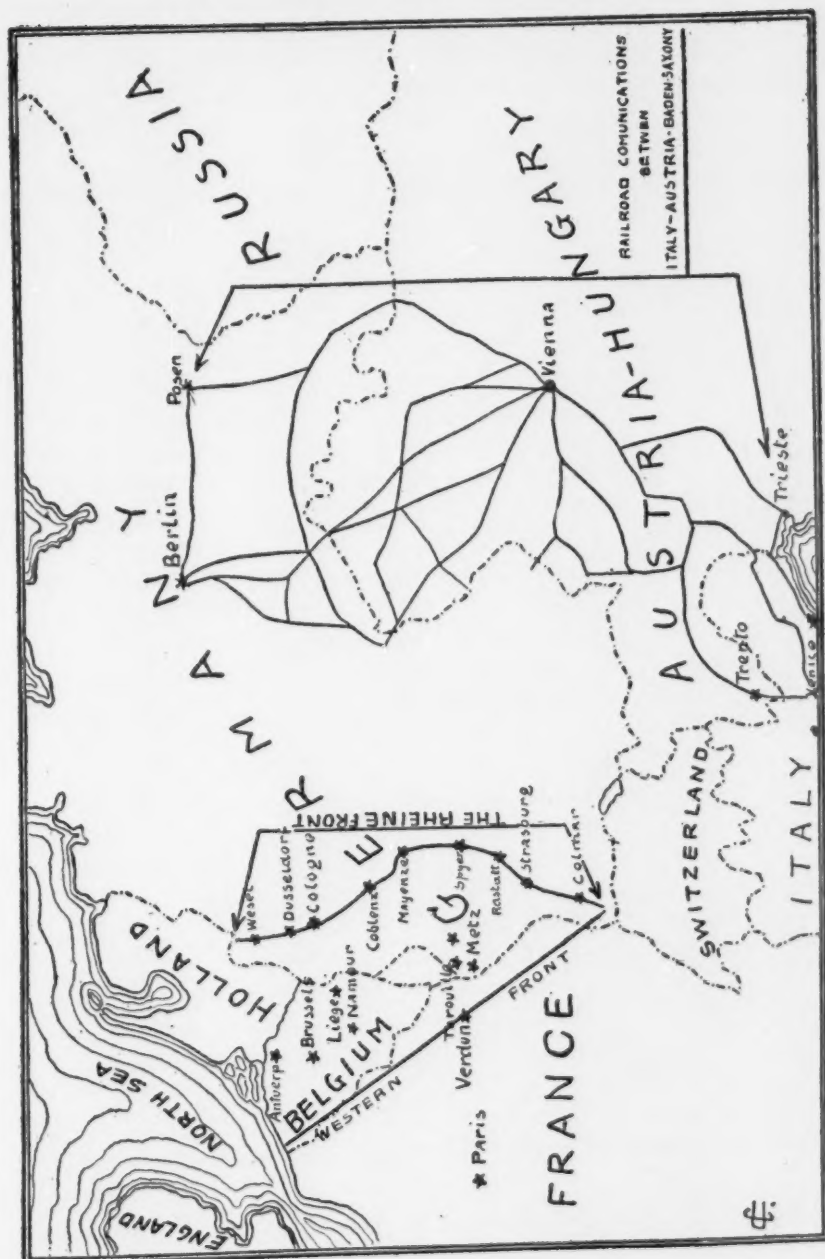
THE CARSO

"The Carso is a hard plateau, all but bare of vegetation; monotonous, rough and stony on the surface, varying in height from 200 to 800 meters above sea level. Its clean-cut limestone slopes appear



ALTIMETRICAL VIEW OF THE ITALIAN FRONT.





to run in all directions, and there is no system in the mysterious flow of its streams, which often run underground.

"Bare, flat places alternate with stony ground, rocks and caves, or with somber marshy depressions which sometimes become gloomy lakes. Even the fields are strewn with a sharp limestone débris, which renders every step painful. This plateau is pitted with foibe or doline, excavations in the rock where at times moisture collects and life is possible. They constitute the only real oases in this barren land.

"The whole area is swept by the Bora, a wind which is alike the enemy of plant and man. The stunted vegetation is confined to the foibe and doline, and only under the more favorable conditions of sheltered slopes develops into undergrowth or woods. The limestone of the Carso is particularly subject to erosion by water, which in the course of ages has dug for itself underground passages and channels. It is a whole network of subterranean streams, which appear and disappear in their unnatural courses, at times forming lakes with no apparent outlet.

"The marked difference of temperature between day and night, coupled with wind and sun, gives rise to that frequent rainfall which is one of the characteristics of the plateau. It is obvious, therefore, that military operations here have had to be conducted on special lines; they have to overcome a terrain which in itself is a serious obstacle to advancing troops.

"The hard limestone makes the construction of trenches very laborious, while the complexity of the surface renders coordination of a military action well-nigh impossible, and tends to reduce it to a series of separate incidents. This can only be prevented by the energy of both officers and men.

"Thus the many difficulties which are encountered on the battlefield of the Carso, from the question of supplies down to the drainage of the trenches, have added a hundredfold to the strength of this natural fortress, which the enemy has but too well known how to use."

This desert stretch of land, which extends from Gorizia to Trieste and links the Alps to the Balkan ranges and Austrian mountains, is an immense natural fortress, which, in the opinion of the military experts of Europe, is the most formidable in the world; and the whole face of this plateau has been honeycombed with

trenches and other means of defense, which the Italians are gradually overcoming and will conquer if the guns asked by the general Italian staff will be sent immediately in large quantities. There are now, I think, a few batteries of heavy British pieces. But they are not sufficient, because Cadorna has to keep his eyes on the other points of the Gorizia sector of the battle line, where there is already a scarcity of siege artillery, which is absolutely necessary in the modern system of warfare, specially in ours, where we are confronted by a chain of rocky positions which have to be dismantled before the infantry could attack and conquer them.

THE ITALIAN OFFENSIVE

Now, you have seen the general configuration of this most difficult field of operations on which the Italians in 1915 began their campaign with a disorganized army immediately after the war against Turkey in Tripolitania, where most of the military resources of the country had been employed. In spite of the commanding positions of the enemy, Italy succeeded in advancing and conquering all the passes and in so seriously endangering the Austrian Empire's safety as to compel it to call on Germany to save her from further invasion.

But Germany could do nothing to help her ally, as the Russians were still threatening her borders, and she could not spare any division for the Italian front; so the Austrians tried by themselves the famous offensive of May, 1916, which resulted in such disaster for their armies and displayed all the strategical qualities of Cadorna and the fighting virtues of his men. It is hard to tell the real purpose of Austria's assault on the Trentino front without the help of Germany and with the knowledge that Gen. Conrad von Hoetzendorf must have had of the fighting strength of Italy. Anyway, he did underestimate the capacity of his foe, as he thought they could not succeed in massing on one section of the front a huge army to oppose him. Undoubtedly his intelligence department did not serve him well and did not keep him posted on all the wonderful development of communications in the immediate rear of the fighting zone in Italy. This error of judgment was fatal to his plans.

The Austrians had on the whole front more than 1,000,000 men, with probably 600,000 in line. Throughout the winter of 1916 between the Val Lagarina and Val Sugana the position had been gradually strengthened, and a large number of batteries had been

brought in position. In the Trentino there were before the offensive started the armies of Dankl von Koevess, under the personal command of the Archduke Charles, the heir to the Austrian throne, with a total strength of more than 400,000 men.

They aimed at the plains of Venetia and the cutting of the Italian armies on the Isonzo—a bold stroke, that if successful would have put Italy out of the war for a long period. But the purpose of Austria was not so much the immediate possible gain as the anxiety to forestall the attack she knew Cadorna would soon again begin against the Isonzo line.

The drive began on the 14th of May with 2,000 guns, of which 800 were heavies. The front of battle extended 30 miles. The Italian front was blasted away. On the 20th Cadorna withdrew his troops to the Seventh Comuni plateau. If the advance continued, the whole Italian center would have been turned and the way to the Vicenza and the plains open, with Lombardy in danger. In this emergency General Pecori-Girardi superseded in the command to General Brusati, who was removed himself to stem the invaders.

On the 30th of May came the climax and the "strafe" expedition ended in disaster for the Austrian army after only a few miles of invasion on Italian soil. On that day 7,000 Austrians fell. The enemy had reached Asiago and Arsievo, but were pushed back to within a few miles of the old boundary line. By the 31st, at Fume the Austrians had been entirely checked at a loss to them of about 100,000 men.

This success was due to the preparation and foresight of General Cadorna. In less than two weeks he had accomplished a stupendous task. He had brought on the threatened front 500,000 men, 75,000 horses, 15,000 carriages, and all the artillery, ammunition and food-stuffs for such an army, and all this in a territory poor in communications and where water had to be brought up from the plains in the quantity of 450,000 liters a day.

THE TRIPOLITAN THEATER OF WAR

But the efforts of Italy in this war were not limited to her northern frontier, and we must also give her the credit of having successfully resisted all attacks of the Turks on her recent acquisition in Africa. When the full history of the Italian war will be written we will find that the pages dedicated to the Tripolitan cam-

paign will tell of untold valor and of the strongest military virtue of the Italian soldiers, who, against overwhelming odds, have silently saved for their mother country a land conquered at the cost of thousands of lives and billions of dollars. The merit of this work is due to General Ameglio, the hero of the African wars, a true son of Sicily, of boundless patriotism, foresight, and sound military and administrative qualities.

A few months after the entrance in the world war the whole of Tripolitania, except the coast, under the guns of the fleet, was lost. General Ameglio was sent on the fields of his former exploits, and in a year of ceaseless work victory was again his, the colony was saved, and the Turks and Arabs captured, dispersed and pushed back in the desert to starve or to be killed by the loyal tribes. In this operation Ameglio had probably at his command less than one army corps. Ameglio, one of the best generals of Italy and without doubt the most popular of them all, has sacrificed his ambition of playing an important part in the main theater of our war in order to serve his country as she requested for her best interest—an admirable example of discipline and devotion, which has endeared him more to the masses of our country.

ITALIANS IN THE BALKANS

Italy has always interposed strong objections to the Dardanelles campaign and to a policy of large operations in the Balkans, aside from the holding of the coast to prevent the establishment of submarine bases by the Germans. The Italian foreign minister, Sonnino, through a long and intimate contact with the Balkan states, had a well-founded distrust of the deposed Greek king, and was loth to play in the hands of his hirelings. The last developments in the Hellenic kingdom have since fully justified his point of view; but still, as the Allies were in a precarious position under General Serrail, Italy sent valuable reinforcements, which, cooperating with the forces in possession of Vallona and the hinterland of Albania, on the Adriatic Sea, prevented any further advance of the German-Bulgarian-Austrian lines on the Balkan front. Here probably are in all another 100,000 Italian soldiers, constituting a third theater of the Italian war.

The connecting link between the operating forces over the seas was the Italian fleet, of whose silent work little has been heard abroad, though it deserves a large measure of credit for the success

of the operations on the other side of the national shores. The work of the fleet in the Mediterranean and the Adriatic Sea was also the means of saving 1,000,000 Serbs from complete annihilation. The Italian fleet's action in this war is well expressed by the official publication, *The Italian Navy*, in the following words:

THE CONDITIONS OF THE CONFLICT IN THE ADRIATIC

"Apart from the smaller fighting strength of the opposing fleets in the Adriatic, the conditions of the conflict were very different from those at work in the North Sea. One of the circumstances of great importance and quite characteristic as regards the Adriatic field of action is the restricted scope within which the combat is limited. The adversaries must take action in a narrow sea where the extent of water surface becomes reduced as you go south.

"It has been said that if an Austrian admiral had formed the plans for the creation of the Adriatic this sea could not have better suited our enemies. Not only so, but the surroundings provide points of advantage for all the subtle devices of war at sea—shelters for destroyers and ambushes for submarines, for cruise by lightly armed craft, as well as far the incursions of hydroplanes.

"All this gains in value greatly when it is a question of hindering the movements, not of torpedo craft, but of cruisers and battleships; not of small squadrons, but of divisions or fleets. And this must inevitably tell in favor of the Austrian fleet exclusively, in that its lesser fighting strength forced it *a priori* to remain in port. As between the two adversaries, one quite able to come out and the other compelled to remain at its bases, the restrictions of the sea area are in favor of the latter.

"As to the other disadvantageous conditions unfortunately reserved for our navy in the Adriatic, they have often been recited—such as currents regularly aiding torpedo craft in their descents on the western shores; such as the shallowness of the water along the Italian coast as compared with some places on the Austrian side, a shallowness which interferes with the work of our submarines and depriving us of the shelters and retreats which exist so abundantly for the benefit of the Austrian fleet, of Istria and the Bocche di Cattaro.

"But the most serious disadvantage in our conditions of warfare is doubtless the absence of any practicable naval bases along

the whole length of our littoral. In this matter the Italian navy has certainly to expiate the past. Levity in the consideration of this great problem, neglect of means for solving it, sluggishness causing discouragements to anyone who has thought out a remedy, private opposition, and general lines of policy, are one and all inadmissible in this matter. If, for example, by means of the system of dykes and canals, devotedly studied years ago by one of our officers, it had been possible to prepare in the central Adriatic a base of operations for our fleet, how vastly improved would be our means of action today! But recriminations are idle.

"The unfavorable conditions in which our maritime war has to be carried on have an inevitable and fatal consequence in the greater wear and tear for our navy, a higher percentage of risk and a more severe régime for our crews, while these risks, this wear and tear, and these sacrifices do not fall to the lot of the enemy. Arising from the conditions, we have to suffer even greater losses. But, on the other hand, these disproportionate risks and dangers, with the difficulties of warlike operations, have in themselves developed an increased strength of purpose throughout the Italian navy, coupled with such ardor on the part of the men that from Pola to Sebenico, from Giuppana to Pelagosa, from the skies of Trieste to the depths below the Acrocerauni, deeds have been accomplished which go far toward paralyzing the activity and depressing the morale of the enemy, revealing the unforeseen possibilities of our sea warfare."

I have tried, gentlemen, to give you in the limit of a short talk a clear idea of the situation on the western and Italian fronts. Now I will briefly say something about the other sectors where our Allies are facing the common foe.

THE WAR IN ASIA, AFRICA, AND RUSSIA

The British forces in Egypt, which have been reinforced by the famous Italian Bersaglieri, have the upper hand against the Turks, and we may confidently expect in the course of a few months to see the liberation of the Holy Land from the rule of the Moslems. The same condition of superiority prevails with the armies of our Allies in Africa and in the rest of Asia where Turkey is particularly exhausted after six years of uninterrupted warfare.

As to Russia, she is out of the game, at least for some years to

come. But she will not turn against us, no matter what she will do. The only danger we can foresee from that quarter is that Germany may organize for her benefit the resources of that country. But the Russians will not fight the battles of the Kaiser. She is in the hands of the demagogues and visionaries, who, if successful in overpowering the more moderate element, will prepare the return of the Czar.

We must not forget that 80 per cent of the Russian people are illiterate, ignorant and superstitious, with the natural instinct of self-preservation, more powerful than any patriotic spirit that is the fruit of education. Anyway, we must be prepared for the worst from that side—and this is the complete elimination of the Russian armies from the field of battle, unless the unforeseen happens.

Therefore, we must be prepared in a few months, perhaps weeks, to see at least half of the German-Austrian divisions on the Russian front brought against us, either on the Balkans, on the Italian, or on both fronts. This will make imperative the immediate reinforcement of these lines.

THE BALKAN FRONT

From Vallona, on the Adriatic, to Monastir and along the Vardar the Allies have probably little over 300,000 men. Here we may have to bear the brunt of renewed attacks by the Teutons, who may choose this field of operation to reach Salonica and neutralize any move that Greece may contemplate to make, seizing the coast for the operation of their submarines, after which it would be more easy for them to strike at Italy, if they do not prefer to attempt the task of a second "strafe" expedition, which already is heralded by the Teuton press, against their former ally. But whatever way they will turn they will act with utmost energy, heartened by the Russian debacle, which has stiffened the resistance at home and their prestige abroad. If they succeed in either of these two ventures, the ultimate victory for us will recede for a couple of more years, and America will have to double her efforts in money and men.

Now, after we have examined the position of the contending forces on all the fronts, I will give you my point of view. I have told you about the manner of winning the war in the shortest possible way, and it goes without saying that we will win. The entrance of America in the conflict made this certain, but we must save for humanity as much as possible of her energies and of its blood by finding a short way to victory.

Now, this lies in the direction of the Austro-German frontier, which can only be reached through Italy, as I have shown on the map. Before the Allies on the western front, with the help of two millions of American soldiers in the first line, will have reached the Rhine, it will take, from a military point of view, two more years, if everything continues to be favorable to our advance on that front. And when our armies will be there our general staff will have to face the same situation that the Italians have been confronted with for two years, viz.: positions fortified and prepared for forty-seven years. I have told you already what array of men and material we must have ready. On the other side, if Italy is supplied with the guns and coal and other help she needs, she has plenty of men to march forward and take advantage of her gains.

The Alps will soon be left behind and the road to Vienna will be open. Once in Austria, Germany will be isolated, and she will have to hurry to her southern line in Baden and Saxony, where are the lines of advance on Berlin. It has been stated at various times in the American press that the Italian campaign has a purely local, selfish character, and that the aim of Cadorna is purely political and self-contained in the program of conquest of that part of Italy called "Italia Irredente." Nothing is more false and misleading, and puts Italy in a false light. We know perfectly well that even if we should conquer Trento and Trieste they could not be kept without defeating the Austrian and German empires; so the ultimate aim of Cadorna has been not the conquering of these provinces, but the attaining of the common purpose of crushing Germany. Naturally, the way to Vienna is through these lands, and their conquest is important to effect the ultimate good. But even if Italy should not be able to attain alone the main purpose of breaking through the Austro-German frontier, the danger of invasion from the south would compel Germany to withdraw a part of her army from the western front and offer to us the chance that we are waiting for—to be in the necessary numerical proportion on that front to conquer her almost impregnable permanent defenses.

The elimination of Austria from the war would cut off the enormous reservoir of materials which lies in that part of the Central Powers, and the German people may at last see light. But if they will not—and we must not put any dependence on such a proposition—Germany will at last be cornered, and her fall would

only be a question of months and not of years. To accomplish this task a year will be more than sufficient on condition that there should be unity in the direction of the campaign, which today is under the influence of several general staffs, which are often under influences not based on military necessities and cannot decide and act with that quickness and thoroughness so characteristic of our foes.

The unification of the different commands of the war in one central body, with absolute control over all the military forces of the Allies, with the civil authorities in the several countries working in harmony with it, is, in my opinion, a condition *sine qua non* of winning this war, no matter how much man power and resources we will put in the fields. We are today, on the whole, superior to the Central Powers, but we have been not only kept at bay in many places, but we have been thoroughly beaten in many others; this because the German staff, acting according to a well-established military principle, taking advantage of the division in command of the several armies of Europe, is trying to beat one at a time; and we may as well state the frank truth—she will succeed if the nations of Europe will not realize their danger, and, putting aside false single national pride, unite under one flag—that of the whole of civilization, threatened by the new barbarians, worthy of their ancestors, the Huns.

The military experts and teachers of war's game have been equally astray in the forecast of the present battles. It was generally assumed that to the armed struggles between whole nations would follow a lightning decision, both on land and sea. But the entrance of the aeroplanes, the submarines, the gas, and the wide employment of heavy ordnance has developed a gigantic and destructive battle, but not a quick one, as was predicted.

The destructive capacity of the present armaments, supplemented by the resources of science applied to war, have imposed on the generals commanding a greater caution in the movements of men. With the old system of battle and the modern offensive weapons, there would be no one left after attack on both sides. Therefore, the armies had to bury themselves below the ground wherever they met an opponent who had the time to repair behind earthworks or were confronted by the hurricanes of steel of modern artillery. The discarded systems of warfare of the seven-

teenth century, where trenches were widely used, have come in vogue again, though they appeared in the Russian-Turkish war of 1859 and with little favor in the last Russian-Japanese struggle in the extreme Orient. So the main characteristic of this war is of the marshaling of millions of men in two gigantic lines of battle composed of several orders of trenches, sometimes miles deep, protected by barbed wire and steel redoubts. To the attacks is also added the difficulties of the mine craters, which interfere with the forward movement of the masses launched in the assault, and the deadly power of the modern artillery, with the barrage fires, the bombing from aeroplanes, and gas. All this clearly explains the reasons of this unforeseen, prolonged war, and to find the ways and means to stop it and break the resistance of the enemy it is necessary to examine the tactical conditions of modern warfare.

Strategy and logistics today remain the same as in the old time of classic wars, because to the increased potentiality of men and machines of the present huge armies the engineering skill of the twentieth century has applied all its resources, while the tractors and motor cars have simplified the maintaining of the logistical and strategical lines. But tactics have undergone a complete revolution with the trenches, the aeroplanes, and the employment of huge numbers of heavy guns. It has been an old dogmatic theory in every military school that the infantry was the queen of the battle, but today I think the mastery of the battlefield belongs to the artillery, with its valets, the all-seeing flying machines, the new terror of the present war as the submarines are that of the seas.

Except on the spectacular invasion of Belgium, the battle of the Marne, and in Asia, there has been little occasion for great tactical movements. Never in the history of warfare have so many heavy calibers been employed in proportion to the infantry employed. In the so-called "strafe" expedition against Italy in the summer of last year in the Trentino, out of 2,000 guns half were of heavy caliber. The trenches have changed not only tactical methods, but also the handling of men in their military and psychological training. In the two last Balkan wars we have the first new lessons of the power of modern artillery. The siege of Adrianopolis, Tanine and Scutari offered to the German general staff the motives for the revolution they have brought in the present struggle, but it was never thought that siege methods would be

applied to compel battles, as at present, on nearly all battlefields of the world. In these wars the aeroplanes had little importance, and they were employed successfully only in the Italian-Turkish campaign in Tripolitania, where again the Germans and French got their first hints of the real part that the flying soldiers would play in the future. But still, ever since 1913, in the Balkans, we who took part in that conflict realized that the trench had come to stay, and that we had to learn over again a good many lessons we had been taught in our military schools.

At the siege of Scutari in 1912-13, where I was chief of staff of the Second Division, I had ample means to observe the enormous importance of trench warfare, and in a report which I made at the Italian war office in April, 1913, about that war I remember to have cited the example of a semi-permanent trench of about 300 yards in length, protected by barbed wire, 30 yards deep, and sixteen quick-firing guns dominating the advance of the attacking infantry. This was practically unconquerable until blown to atoms by an overwhelming heavy artillery fire. This trench was captured after seven assaults, after its destruction by fire of guns of 150 mm.

TRENCH WAR

I have been requested to talk about the trench warfare, but I have been away too long from the battlefields to be competent to do so, so I shall confine myself to general notions and to the psychology of the struggle in and around such earth defenses.

Of course, you all know of the different customs and kinds of trenches—temporary, semi-permanent, and permanent—but I want to disabuse your minds of a general belief that the present or future battles will be fought entirely around or from them. Their employment will be limited to circumstances of war, when one army, being not in numerical condition to successfully oppose the adversary, will find it more profitable to resist him under cover than in the open or when the attacking party, being similarly situated, must resort to the same protection.

When two forces are equally or nearly balanced, this kind of struggle is exhaustive, and will present a special aspect to be seriously considered by commanding officers.

Most of the trenches on the western front have revetments of wicker work to keep the walls from caving in or crumbling, but on



SIEGE OF SCUTARI

A semi-permanent trench, 300 yards in length, defended by sixteen machine guns and taken only after seven assaults and the fire of 150-mm. guns



the Italian front there is in use a sort of steel trellis, which is easily put in place and is not readily damaged by fire. Behind these defenses there is an extensive second and third line, usually constructed of solid concrete trenches, protected by steel shields cemented in the parapets.

SUBALTERN LEADERSHIP

The extension of modern tactical development has created an exceptional importance for the leadership of the subaltern officers, and for this reason we can say that the present war is essentially the war of the subalterns and of the commandants of small commands.

The life in the trenches has brought about a more intimate contact between the men and their officers. They must always be on hand for all unforeseen attacks and emergencies, developing the employment of so many defensive agents quite unknown in the time of the old siege wars. Surprise attacks nowadays are a common occurrence, and they take most unexpected forms, varying from aeroplane bombing to liquid fire and trench bombs, together with many more devices, all very effective in their destructive power. The psychological and physical preservation of his men must be the constant preoccupation of the officer, because the long days, weeks and months in the limited environment of the walls of the dugout wear out the best men if they are not trained to face such novel conditions of war. The bravest troops sometimes prove to be rather troublesome trench dwellers, where patience, calm and steady nerves are essential qualities for success. All the efforts of the subaltern must therefore bend on becoming more intimately acquainted with his men, putting aside that formality which is one of the characteristics of military life.

The subaltern can do this without affectation and without impairing discipline, by showing a genuine interest in the welfare of his inferiors, to whom he will set the example in all the details of his life. A kind word, a cigar or cigarette given or asked in an unaffected way; a compliment paid or a word of sympathy dropped at a proper time; a warning or a reproach given without anger, but with earnestness when essential, and not in homage to usage or custom, will build a spirit of discipline stronger than the sitting up on the *qui vive*, every moment, with the book of regulations in hand.

In the training of men we must not lose sight of the ultimate purpose of it, which is to obtain the maximum of effectiveness at the moment of the attack delivered or resisted. The modern assault has very little of the picturesque charges of old, with flying colors, drum beating, and wild cheering, of huge masses thrown against each other, after comparatively short artillery preparation. Today everything is regulated with the watch in hand, the telephones glued to the ears, the signal flares ready and the runners only as incidental helpers for short distances.

A minute lost or gained, on the appointed time, may mean the destruction of our men by our own fire. The pace of the attacking men, their position, the way of advance and retreat; everything in relation to the supreme moment of physical contact with the enemy must be prepared with extreme care. In the assault there is a tendency to cluster too close together, or to scatter round in panic; both tendencies must be warned against and the soldiers must be trained to rally round their leaders, and these to hold always close contact with their men. But remember never to leave them without leadership; officers, and commissioned officers must be always on the lookout, to see that the fallen superior is immediately replaced by his subordinate. A disciplined troop well trained in the assault and in repelling it, even if outnumbered, will win against troops of superior number. Discipline is equally important as bravery and the latter is useless when deprived of the former.

In America you will have an advantage over the armies in Europe, because the educational standard of your men is superior, and the universal practice of sport in your troop will overcome the handicap you will encounter with a raw human material not brought up to universal military training. But on the other side, it is important that you should impress more strongly in the minds of your men the necessity of a discipline, which to a good many, will appear as a mere drudgery of barracks life, and a tedious and unnecessary thing in war time. But the very superior educational standard of your men will be in the way of absolute obedience, which often will not be given, without mental reserve or discussion; this will be easily overcome with the appeal to the patriotic spirit, which is ever present in the souls of the American youth, who has been so splendidly brought up in your model schools, in the respect of the flag and for all the ideals for which she stands.

The life in the trenches seriously impairs the cohesion, the mobility and the enthusiasm of the troops; so it is well to cultivate *esprit de corps* which is a powerful factor on the battlefield. A regiment of Highlanders, or of the Irish brigade, in the British Army; a battalion of French Chasseurs, or Zouaves; a company of Italian Bersaglieri, or Alpini, have twice as much fighting efficiency as the other soldiers of the same nationality, and you have in your Marines, such a splendid record, and such a picked element, to make their work twofold effective, first for their own individual contribution to the war, second for the example which they will set to other bodies of your army. Now you must utilize this psychological power in building up a perfect team work between man and man, and their superiors. To such trained troops, with the Stars and Stripes floating over them, belongs the victory.

I said at the beginning of my talk that, as soldiers, we could not take into consideration, in our preparation for victory, other elements which did not belong to our province. But we can take advantage of special conditions born out of happenings which are not the direct result of our military efforts, as, for instance, the inferior political and economical situation of our enemies; but I must say something on the submarine war of Germany and on its blockade by our naval forces; neither of the two will have, in my opinion, a decisive influence on this world's struggle.

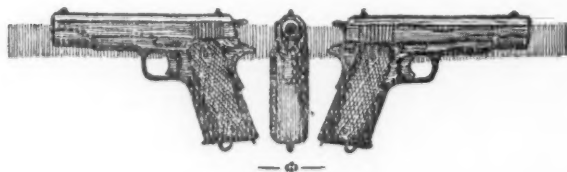
The Central Powers are too big to be starved with our present system, and with the loose links of neutral nations, in the chain of iron, that is thrown around them. On the other side, the Allies, having at their back three-fourths of the world, cannot be beaten, and Europe cannot be isolated from the rest of fighting humanity. America in spite of the enormous destruction of ships will be able to transport to France all her troops and material, with very few losses, as Canada has done in the last three years, and as Italy did in the Adriatic with the Serbians and Allied soldiers.

Germany is destroying 10,000,000 tons of shipping a year, the Allies are building 7,000,000; it would take about ten years for Germany to prevent communication between the different groups of her enemies, if her efficiency could continue in the same ratio as at present and we were always lacking in our productive capacity; which we know is quite the opposite. Therefore we cannot count on shortening the war with the blockade, nor Germany with her sub-

marine campaign. This ruthless and inhuman indiscriminate slaughter of innocent victims adopted by Germany, has been, with the shelling of open cities, and the barbarous treatment of conquered regions, the cause of the revolt of the civilized world against a nation which stood so high on the ladder of civilization. This was the cause that has brought America to the side of Europe. This country is fulfilling today its historical mission, reserved to her, in the divine mind of our Maker, that of guardian-angel of a humanity which for four centuries found here shelter and prosperity. America could not have kept aloof in this conflict between the brute force of barbarity, and the ideals of liberty and civilization. So your country has thrown herself into this struggle heart and soul, with the energies of a regenerated humanity in the land of the brave and the free.

To you, brave sons of this country, and grandchildren of mine, is entrusted the greatest and noblest of tasks, so splendidly expressed by your illustrious President in the words, that "The world must be made safe for democracy."

You are going on the battlefields of Europe, as the new crusaders of freedom, where your country will shine, not only with the glory of your valour, but also with the civic virtues of the grandest and greatest of all modern nations. And you will win, in the name of God and liberty, because above our heads on the blue skies of the battles, blotted by the vaporous emanations of instruments of death, are keeping guard the legion of the departed great men of this glorious America from Washington, Lincoln, Grant to McKinley; from Patrick Henry to Jefferson; from Paul Jones to Dewey—surrounded by the martyrs of freedom of every country in every epoch.



ARTILLERY IN EUROPE¹

MAJOR M. E. LOCKE, 8TH FIELD ARTILLERY

THE following notes and impressions of the writer are the result of his recent presence in Europe, both on the western front and elsewhere. The observations made pertain particularly to artillery activities, and other matters outside of that sphere were merely incidental. The impressions obtained resulted from visits to training and school centers of the English artillery in England; to the schools, ammunition parks, ordnance repair shops, and operations of intelligence, balloon and airplane services behind the British lines in France; the operations of the artillery staffs at British Great Headquarters, Army Headquarters, Corps Headquarters, and Divisional Headquarters; also visits to all types of British artillery in position and firing, forward observing stations, and general scenes of activity at the front from Ypres to Armentières. This front was the scene of the successful Wytshaete-Messines attack on June 7 last and the further advance in this region since August 4 of this year. Embraced also in this visit was a trip to the French front in the vicinity of Rheims, covering the sector of Craonne-Moronvilliers.

The writer was particularly struck with the operations at the Wytshaete-Messines battle above referred to, as they constitute one of the most, if not the most, successful offensives of the Allies to date. This battle resulted in forcing back the German line for an average depth of two thousand yards, over a ten-mile front, and destroyed the southern face of the troublesome Ypres salient. It was accomplished with a minimum loss of men, which was due in a great measure to the power and efficiency of the British artillery; which after a seven-day bombardment, covering every objective in the area selected for assault, succeeding in overmastering the German artillery and causing the withdrawal of its guns. With its own divisional guns the British then formed, on the day of the assault, a rolling barrage and a standing barrage for its infantry. The infantry followed this rolling barrage, at a distance varying from fifty to one hundred yards, and captured the ground above

¹From *Field Artillery Journal*.

described. It will be seen, then, what a controlling influence on any offensive the artillery exercises in this war. The French and British now possess a formidable artillery, both in numbers and efficiency, and it is still being augmented. Such an artillery is secured by the mobilization of all national industries to produce the matériel and the most thorough organization and training of the personnel. Our task is the same as that of the Allies.

Our present artillery organization is believed to be very satisfactory in many respects until we get beyond the regimental organization. We have yet to create the artillery staffs for the higher units. Abroad, the artillery staffs of the armies, corps, and divisions are quite numerous and might seem, when listed, to have an excessive number of officers, but in both British and French armies it can be safely said that there is not one too many officers to coordinate the complex activities of the artillery, especially during such an offensive as above described. Organizations for such staffs will undoubtedly be evolved for us. It is regretted that data on this subject must be excluded from an article such as this.

The subject of training or instruction is most important. The training of officers and men ceases only during the time when actually engaged at the front. Before going to the front there is intensive instruction for both the new officers and the new men. Immediately upon the withdrawal from the front for purposes of rest, selected officers and men are at once sent to various schools behind the lines and there instructed. This applies not only to the artillery, but to all branches of the army. Behind the French and British lines there are schools of application for every form of military activity. Every British army has its artillery school, and at this school officers are given the training which will keep them ready to employ the methods of the "moving battle" (war of maneuver), as well as the methods of trench warfare. The article by Colonel Reilly in the April-June number of the *Journal* described the French artillery school at Fountainebleau, giving some idea of the extent and thoroughness of just one phase of this training. It was the writer's privilege to visit and inspect this school thoroughly. It is sufficient to say that it turns out nine thousand fairly well-trained artillery officers a year. It is impossible to give here the results obtained by these intensive methods of instruction, but the writer can say that he has seen field batteries which were trained in

three months from raw recruits. He saw them when they were ready to go to the front, at which time they conducted service practice and executed mounted drill in a very creditable manner. There is no doubt that a system which can turn out efficient troops in such a short time is a growth. By this time a great corps of instructors, drawn from officers who by reason of wounds or other disabilities are no longer fit for the front, is available for this work. Such a corps is lacking with us at present. By the return of officers to this country, after a certain service at the front, for duty as instructors, the work of instruction can be greatly expedited.

In the conduct of artillery operations, trench warfare has produced many changes. The normal appearance of a field battery in position is quite different from what one would expect, judged by the open battle methods taught in all armies before this war. The guns are kept in pits or surrounded by trees to such an extent that distant aiming points are impossible. No caissons are with the guns, the ammunition being in racks in the pits. These pits have little or no covering, usually only sufficient head covering to resist shrapnel or shell splinters. The limbers and horses are ordinarily one to two miles in the rear of the guns; the B. C. station, if such exists, is in the battery itself.

All observation of fire is made from the posts of the forward observing officers (F. O. O.'s), which are called observation positions (O. P.'s) and are in masked and carefully protected positions located near the first line of trenches. If possible they avoid putting the O. P. in the front line trenches themselves. These O. P.'s are connected by telephone with their batteries, and from them the fire is conducted, usually by the captain, during an important action. During "Peace Time War," as the English call the normal conditions along the front, the duty of F. O. O. is taken in turn by each of the battery officers for a certain length of time. This duty at times is, of course, extremely dangerous.

The personnel at the battery usually have dugouts constructed wherein they can take refuge when bombarded. It is expected that they take refuge in these dugouts whenever the battery is bombarded, unless they are engaged on some special or important gun service, such as delivery of a barrage. In such case they must remain at their posts, whatever may be the cost.

Over each gun is stretched a canopy of netting to which are tied

tufts or strips of burlap painted green, yellow, and brown. These nets form the *camouflage* for the guns and diminish the chances of their detection by aerial observers. Every British light gun carries on it as part of its equipment one of these nets. Extra ammunition is scattered around everywhere in the vicinity of the battery ("dumps"). Every such "dump" is *camouflaged* with brush or by paulins thrown over them and painted the various colors required by that particular terrain. The art of *camouflage* is one of the most interesting products of this war. It calls to its service everything, from the work of artists and sculptors down to that of day laborers. It is regretted that this article cannot more fully describe its activities.

The wire communications of a battery in position are a very complex thing. There is frequently a telephone exchange in the B. C. station which makes it possible for the B. C. to talk to his division commander, to his battalion commander, to his F. O. O.'s, and to the commander of the infantry whose front he protects. To many of these officers he has alternative routes of communication besides the direct lines thereto. All telephone wires are buried six to eight feet in the ground until the area of the trenches is reached, where, if it is no longer possible to bury them, they are pinned on to the side of the trenches. All telephone lines in the trench area have the double metallic circuit, as the ground return permits the enemy to read all messages by means of detectors created for the purpose. For the same reason messages at the front are sent in buzzer code instead of by voice. Both sides forbid the use of spoken messages over the telephone where the lines are located in the trench district except in the greatest emergencies.

It is not an uncommon sight in the posting of batteries to see the guns posted in tiers. The firing of artillery over personnel in its front is taken as a matter-of-course procedure. Batteries in the lower tier of guns usually have a parados in the rear of each gun as a partial protection from premature bursts of guns in the rear.

The writer cannot recall having seen the employment of a distant aiming point in any battery, light or heavy. The siting of the guns usually forbids this. The normal procedure seemed to be to establish the direction of the directing gun by the use of the map or compass bearings, then establish parallel fire in the battery and give each gun its own aiming post not more than fifty to one hundred

yards away. Another method was to establish by some form of survey the line of fire for a sort of sight bar set up close beside a gun and then by means of a reflecting apparatus on the gun sight secure parallelism of the gun with the sight bar.

It will be seen, from the extent of the communication system of a battery, that a great number of men will be needed in the B. C. detail. British batteries, including signallers, have about twenty-one men. Our own details will have to be materially increased and signalling must be carefully taught, using all the various kinds of materials—large flag, small flag, telephone, buzzer, daylight lamp, daylight shutter, etc., depending upon conditions. Every known means of communication has been, and may often have to be, employed, including such things as rockets, flares, carrier pigeons and dogs. So great is the need for many and thoroughly expert signallers that every British battery endeavors to maintain a competent understudy for every signal man in the detail.

As regards the technique of firing, the following were noticed as among the most important features:

- The widespread use of firing by the map;

- The frequency of firing by compass;

- The methods of conducting "airplane shoots" (conduct of fire from airplanes);

- The calibration of guns to compensate for loss of muzzle velocity due to wear of the guns;

- Corrections for atmospheric conditions;

- Corrections for map's distortion.

It will be seen from the above that a large amount of the work of the guns partakes of the character of bull's-eye shooting, particularly when charged with the destruction of small material targets. At any rate, every precaution is taken to insure the shot falling in a small zone.

Three great kinds of work exacted of the artillery may conveniently be grouped as follows:

- "Destructive shoots";

- Counter battery work;

- Barrages.

The "destructive shoot" is firing undertaken to demolish various hostile structures, such as firing trenches, communication trenches, wiring, dugouts, depots, dumps, etc. These "destructive shoots"

may be performed by all classes of guns, but are usually the function of the heavier calibers. Counter battery work is usually the function of the heavy guns and howitzers. Like the subject of *camouflage*, a detailed description of the various activities of counter-battery work extends far beyond the scope of this article. The head of a counter-battery service calls to his aid for the location of hostile batteries the assistance of the intelligence, flash-spotting, balloon, airplane, and aerial photograph services, to say nothing of the map department. He assigns to his batteries for destruction all targets located by the foregoing instrumentalities.

Barrage firing may be a curtain of fire which rolls along the ground at a predetermined rate. This is called the rolling barrage. Behind it marches our own infantry at such a sufficiently short distance that they are able, after a barrage has rolled over a trench, to rush into that trench before the defense can come up from their dugouts and line the parapet with their machine guns. It goes without saying that during the intensive bombardment the defense cannot remain in their fire trenches and live. They must take refuge in their dugouts.

The standing barrage is a curtain of fire which moves by a series of lifts or bounds, varying in amount, having some definite objective at each lift. Its principal duty is to bring fire to bear on certain areas in advance of the rolling barrage from which ruinous fire might be delivered upon our attacking infantry, as, for example, machine guns posted in suitable places and fired by indirect fire through our rolling barrage into our infantry. The standing barrage, by the use of smoke shell, also masks the progress of the attack from the enemy.

All barrage fire is a function of the divisional artillery. It seems well established that infantry, after proper artillery preparation, can advance under the cover of a well-regulated barrage, but its advance is limited to the range of the guns. When the extreme limit of the barrage has been attained the infantry must consolidate and wait until the guns can be pushed to the front. A multitude of details must be cared for when making the arrangements for barrage firing for a great attack. The coordination of these details finds its expression in the barrage maps prepared and issued by each corps and in the firing schedules prepared by every battery commander. In doing all the foregoing the need for the numerous

high artillery staffs already spoken of becomes apparent. Once supplied with his barrage map, every battery commander must make out for each of his guns a time-table for firing in the barrage. This table is far more exacting than that of any railroad train, for every gun must during every designated minute of time fire a certain number of shots with a certain set of firing data different for various times.

The infantry in the front line trenches has a certain amount of divisional artillery told off to defend its front. Infantry in the front line trenches, which suspects an attack, sends in to its supporting artillery an S. O. S. call. Censure awaits any battery which fails to respond by fire within thirty seconds after the call is sent. The response has come in seventeen seconds. The fact that guns are, when not otherwise employed, always kept laid on their S. O. S. positions and that the sector for each gun is so small simplifies this performance somewhat.

Undoubtedly there will be evolved some "doctrine" of training for all our artillery, designed to give instruction in all that it is needful to know in this present war. It is believed that this instruction will involve the following subjects for artillery officers, some of which had not attained before the war the importance which they now have, viz.:

- More instruction in map and compass firing;
- The preparation of battery battle charts;
- The calibration of guns;
- Correction for atmospheric conditions;
- Greater proficiency of officers in all kinds of signalling;
- Aerial observation of fire;
- The conduct of fire at service practice from O. P.'s;
- Camouflage*;
- The preparation of barrage maps and time-tables;
- Methods of counter-battery work.

In the pursuit of these studies the instruction must never lose sight of the principles covering artillery in the open battle as laid down in our drill regulations.

SPOTTING PRACTICE FOR FIELD ARTILLERY¹

By I.-I.

TRAINING hundreds of young men to be officers by intensive methods, with very limited resources, is a problem of huge proportions. In an attempt to establish field artillery instruction in the training camps, National Guard units of that arm were sent to them for station during the first session. It was hoped that double use might be made of the matériel by having it on hand both for the training of the candidates and the organizations to which it belonged. In some cases this deprived states of all of their field artillery equipment, so that there was none to use in training the new units that were formed. True, in some cases it has been reported that patriotic feeling, accompanied by the spur of necessity, has resulted in the building of wooden fieldpieces which with spare sights attached, have answered the purpose quite well for drill purposes; but the work of improvising means has a limit, depending upon the capacity of those engaged and the matériel at hand. The shortage of equipment not only affects training camps and National Guard, but the whole new National Army as well. It is expected that in consequence of the lack of matériel there will be more or less hesitation on the part of some as to the methods to pursue in order to quickly pick up artillery technique. It is believed that it is incumbent upon all of us to put unpublished methods in the hands of our new officers with a view to assist in speeding the general preparation and in helping them particularly in those locations where they are waiting the arrival of matériel. Under these considerations, certain methods which were developed in the First Field Artillery at Schofield Barracks, Oahu, several years ago, are described.

At different times methods for preliminary training and indoor work have been devised which have resulted in the present systems of blackboard and terrain-board firing. To date, outside of actual firing, well-manipulated smoke bomb practice is the best way we

¹From *Field Artillery Journal*.

have for teaching quick thinking in the conduct of fire, as well as illustrating the proper handling of the sheaf, because the visible effect is more nearly that of actual target practice than any other scheme practiced. It is highly important, therefore, that this drill should be frequently held. Its particular disadvantages have been the time necessary to make preparation for its use by more or less permanent arrangements and the necessity sometimes for going long distances in order to find a suitable range upon which it may be installed; it does not permit a ready adaptation for moving targets, either. Rapid and correct handling of black-board firing should be considered as a preliminary essential to smoke bomb practice. As a *substitute* method only, where smoke bomb firing cannot be held, the system of "spotting practice" is outlined, with the idea of having it put in use to supplement black-board work. Its advantages are:

- (a) Outdoor work necessitating the use of field-glasses;
- (b) It can be held at short ranges in the immediate vicinity of camp;
- (c) It keeps the signalmen in proper training;
- (d) It can be operated with almost equal rapidity by either semaphore or telephone, except in the case of moving targets, where semaphore should be used;
- (e) It necessitates quick thinking on the part of the person conducting the fire;
- (f) The matériel used can be easily carried between camp or barracks and the place of operation.

STATIONARY TARGETS

Matériel Needed: (a) Ordnance miniature targets or paper soldiers, about 4 to 6 inches high, sold in toy stores for children, tacked to stakes 6 inches long by $\frac{1}{2}$ inch wide, so that they may be easily stuck in the ground in any formation desired. (b) A marker consisting of a staff about 6 feet long, having at its end a circular tin disk, 5 or 6 inches in diameter, one side of the disk being painted white (air burst) and the other side black (graze burst). The marking staff for pistol practice will do. (c) Two telephones with one reel of wire, or two semaphore kits.

Personnel Needed: One signaller (telephone or semaphore operator) at the station of the acting B. C.; one signaller (telephone or semaphore operator) at the target; one marker at the target.

Method of Using: The conductor of fire (student officer) at the B. C. station gives all the commands, just as they would go to his battery if present, and they are sent by the signalman stationed with him, as given, to the signalman at the target, who calls them out, as received, to the marker. The latter assumes initial errors (similar to black-board methods) are made, and indicates the bursts with the staff (which, when not being used, is kept with the edge of the tin disk toward the B. C. station) by dropping the disk into the position of the assumed burst for each shot, keeping it exposed there for two seconds for each shot indicated, and then withdrawing it. Whenever air bursts are indicated, the white side of the disk is exposed to the B. C., and for grazes the black side is exposed, always letting the lower edge rest upon the ground in this latter case. Using the telephone, the marker assumes the approximate time of flight for the range ordered before marking. With the semaphore (as the work may be rather slow) this is not necessary at first.

Arbitrarily it may be assumed by the marker (who at first should be a commissioned officer) that a low burst is between the shoe-top and the ground; a normal burst is between the calf of the leg and the shoe-top; a high burst extends anywhere between the knee and the calf of the leg; a very high burst would be indicated at some reasonable height above the knee. Any similar estimate to suit the assumed range will do, bearing in mind the relative height of the target. A reasonable frontage in mils must also be assigned the target, and the width of the sheaf estimated upon that as a basis for shifts of the same corresponding to the commands.

A number of targets of various kinds at different ranges should be set out, in order that the sheaf may be shifted for each new problem.

At the battery end, the senior officer present should note errors made on the part of the one who conducts the fire, and, after the problem is completely fired, hold a short *critique*.

Students waiting their turn to fire a problem at spotting practice should be required to:

- (a) Make a panorama sketch of the terrain and targets;
- (b) To listen to the conduct of fire and to be prepared to conduct a *critique* if called upon to do so;
- (c) To record all observations exactly as at smoke bomb practice;
- (d) To be prepared to conduct the fire at any time that an officer is "killed" for making a bad mistake during his problem;

(e) To occasionally relieve the signalman at his work at the telephone or semaphore;

(f) To take turns at being "recorder" for the conductor of fire, for the purpose of keeping a permanent record of all commands given.

Care must be taken that the marking disk is not exposed in each position for more than two seconds for each shot. Quick thinking is vital. To use a greater time in marking is to encourage bad habits.

The marker must not stand so that the shadow of any portion of his body falls upon the target.

At first, if the officer who conducts the fire takes more than 10 seconds to give the next command after the "flash" of the burst of the last shot of a salvo is noted, the director "kills" the officer. After a few lessons this time is reduced to 7 seconds, and this rule is invariably followed. When this detail is carried out an extra officer should act as timekeeper.

Actual ranges should vary between 150 and 300 yards. Since the figures are very small and grass 3 or 4 inches long conceals them to a large degree, very gently rolling cleared spaces, with short grass, are the best.

MOVING TARGETS

These are direct fire problems. It is (for smooth working) assumed in spotting practice that the direction of fire is always successfully adjusted by the chief of platoon after the first salvo or volley is fired.

At the battery end semaphore signaling is used. An extra man is needed to tow the target and to call out (quietly) the range to the marker. The man who tows the target is given some such direction by the marker as this: "Tow your target diagonally toward the right flank of the battery that is supposed to be firing;" or, "From this (indicating) point to that (indicating) point; assume your initial range as being 2,400 yards, walk very slowly, every eighth step call out a range 100 yards less." The man towing the target calls out "2,400" as he starts to take his first step, "2,300" as he takes his eighth step, "2,200" as he takes his sixteenth step, etc. This lets the marker know constantly what the assumed range is. The marker follows the target and listens to his signalman, who follows him. The marker's signalman watches the B. C. position as he

walks along and calls out to the marker the data as they are given by the semaphore man at the B. C. station. This shows the marker instantly how to mark, since he remembers the last assumed range called out by the man towing the target.

In conclusion, it may be said that this method is not a theory. It was used by every battery in the battalion in which it was initiated. In demonstration problems before an artillery inspector these batteries made faster time than all other batteries. The smooth working of the details and the quick thinking and operation of all parties concerned in these tests are to be attributed, probably, more greatly to many hours of this particular kind of instruction, day after day, than to any other single matter affecting this result.



THE TRAINING OF SENIOR N.C.O.'S AT THE FRONT¹

MAJOR P. R. SARGEAUNT, R. G. A.

WHEN a battery is in action it is usually considered necessary that there should be at least one officer with the guns and another at the O.P. The majority of batteries in France are now well supplied with officers, but a time may come when officers are not so plentiful as they are at present, and it seems advisable to be prepared for such a time.

In the French Artillery noncommissioned officers receive sufficient training to enable them to fight a battery, and the writer has heard French officers compare our artillery unfavorably with their own for the reason that our noncommissioned officers are usually incapable of taking charge and fighting the battery in the event of their officers becoming casualties. Now there is no reason why this should be so. Every senior noncommissioned officer should be a potential officer, at least, as regards the actual fighting of the battery. During trench warfare there is ample time available in which to train noncommissioned officers sufficiently for this purpose, and it is proposed to consider the general lines on which this training should be conducted, and the best method of carrying it out.

It is not intended to suggest that a battery commander will at all times be able to carry out a system of training when his battery is in the line. During active operations it would be out of the question; but in the lives of most batteries there are periods of semi-inactivity on a quiet sector of the front, when there is ample time for this training, and if it entails a certain amount of trouble the results attained should be sufficient compensation.

The first points to be considered are the subjects in which the average noncommissioned officer will require instruction before he can efficiently take charge of the battery and carry out work which is normally performed by the battery commander and his subalterns. These subjects are really very few, and may be roughly summarized as follows:

¹From the *Journal of the Royal Artillery*, August, 1917.

1. Director work and laying out lines of fire.
2. Ranging.
3. Map reading.

These three headings will be discussed separately with a view to seeing the best manner in which they may be taught. Certain minor points and side issues will appear in connection with each, and these will be dealt with as they occur.

1. DIRECTOR WORK AND LAYING OUT LINES OF FIRE

All noncommissioned officers should be able to use the director, but owing to the rapidity of promotion in many batteries on active service, and to the lack of opportunities for training, it is the exception to find noncommissioned officers as proficient as they were expected to be in peace time in this respect.

Section commanders should be made responsible for this training, and they should have no difficulty on days when they are off duty in holding small classes of instruction for, say, the sergeants and corporals of their sections. All that is required is that the noncommissioned officer should fully understand the director and all operations connected with it. The word "fully" is important. Simple instruction that the director is a few searching questions will often reveal the ignorance of noncommissioned officers, and even of officers, in the working of it.

The various methods of laying out lines of fire must be taught, and the mysteries of the compass and rites in connection with T.O.B. explained. A little enterprise on the part of subaltern officers will tend to render this instruction more interesting. For example, in laying out lines of fire by the T. O. B. method a known point on the map can be selected for O (which for obvious reasons should not be in view of the enemy for instructional purposes), and an object picked up which is visible from O and in line with some target in the arc of fire of the battery. The range and angle of sight along OT can be given from the map by the instructor, and one or more of the class allowed to get the battery onto the target. Then, by comparing the line and range on the guns with that given by the map, the accuracy or lack of accuracy with which the operation has been conducted will be apparent.

After a few days instruction every noncommissioned officer should be capable of laying out the lines of fire of a battery by any method,

and of deciding the best method to make use of according to the situation.

2. RANGING

This perhaps presents the greatest difficulties as regards instruction. At the same time it is of the greatest importance and cannot possibly be neglected if the desired end is to be attained, that is to render noncommissioned officers capable of fighting the battery. Only by actual practical and personal experience can efficiency in ranging be arrived at, but much can be done in the way of preliminary instruction.

In the first place the general principles of ranging as laid down in F.A.T. must be thoroughly inculcated; to great a stress cannot be laid on the importance of a thorough grip of these principles being obtained before any attempt is made to put them into practice.

It is not proposed to discuss the rival merits of different methods of ranging; battery commanders have their own ideas on the subject, and will, no doubt, wish to impress on their noncommissioned officers the advantages of their favorite methods. But the elements of ranging as set forth in F.A.T. must be mastered by all.

The next step will be for the pupil to see the principles he has learned put into practice. It is not always possible to have noncommissioned officers at an O.P. as spectators, as, for example, when the O.P. is in a trench and observation has to be carried out by means of a periscope. But in many cases, such as when the O.P. is in a house, it can be managed. The noncommissioned officers can then watch series carried out by the battery commander or other officer, and should be made to record their own observations of the fall of each shot, and also the orders they would have given to the guns had they been conducting the shoot. At the conclusion of the series a discussion can be held, and the noncommissioned officers who have been observing should be encouraged to ask questions, especially as regards any orders which differed from those they themselves would have given.

But actual personal experience in ranging is also necessary, and this is not easy for noncommissioned officers to obtain. At the same time it seems almost worth while to set aside a few rounds daily for this purpose, and as the noncommissioned officers gain experience they might be allowed to carry out actual tactical shoots. In fact, it is important that they should do so, for in this way only

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2. Ranging.
3. Map reading.

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will they acquire that sense of responsibility which leads to self-confidence. But this will be referred to later.

Assuming, then, that a few rounds are allotted daily for instructional purposes, targets would be selected, and the noncommissioned officer or noncommissioned officers under instruction would range on them under the supervision of an officer, who, however, should make no remarks during the series unless it appears to him that ammunition is being wasted. The targets should be easy to start with, increasing in difficulty as the pupil became more proficient. It is not to be expected that noncommissioned officers will be capable of ranging the battery on any target after a few practice shoots; some officers are more successful in ranging than others, and it must be the same with noncommissioned officers. The operation of ranging appears simple at first sight, though in reality it is not so. But the officer who has had experience in ranging will be able to point out the pitfalls to be avoided, and with perseverance the noncommissioned officers under instruction should become sufficiently expert for all practical purposes.

3. MAP READING

Map reading is very simple, and this should be pointed out at the start. In trench warfare especially it is important to be able to identify points on the map with those seen on the ground, and this can best be taught at the O. P. In connection with this, a proper appreciation of distance is essential; the tendency to underestimate the range to a given point is one of the commonest mistakes of the beginner, and one of the first that should be corrected.

While on this subject it is worth while considering the great value during trench warfare of being intimately acquainted with all the country visible from the O. P. Every senior noncommissioned officer should be capable, as every battery officer presumably is, of switching the guns onto any target seen from the O. P., provided that it is within their arc of fire, without having to use a map, protractor or range scale.

In connection with map reading the method of getting the guns onto a target from the map must be taught, not only with the use of a properly constructed map board, but also by the method of using a right-angled triangle of which the hypotenuse is the line *BT*.

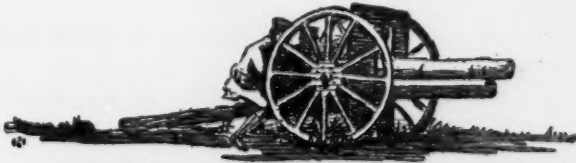
The above remarks are only intended to suggest an outline of the

training that is required. There are other minor points on which instruction should be given, and these will readily present themselves to the battery commander. At the same time, if senior noncommissioned officers are conscientiously trained on these lines, any one of them should be capable of taking charge at the guns or at the O. P. in the event of the officer there becoming a casualty.

But there is one other matter that must not be overlooked; that is the importance of allowing senior noncommissioned officers a certain amount of responsibility in order that they may gain self-confidence. A man may be quite capable of carrying on as long as there is an officer at his elbow and he knows that nothing really depends on him. But when the time comes for him to make some practical use of his training, when one or more of his officers are casualties and he is left in charge, then, unless he has acquired a feeling of self-confidence, the probability is that he will lose his head, and the consequences will be disastrous.

So when a battery commander considers a noncommissioned officer sufficiently expert he should occasionally allow him to carry on by himself both at the O. P. and at the guns. Battery commanders will no doubt be loath to do this, but in no other way can our noncommissioned officers be expected to be ready to take the place of their officers.

We do not know how much longer the war will continue, but it is quite possible that before the end there may be a prolonged period of moving warfare. We must expect heavy casualties then, and we may have to look to our noncommissioned officers to fight our batteries. Then will any previous training they have received be found invaluable.



THE MARINES HAVE LANDED

(Continued)

COLONEL ELISHA THEALL, U. S. MARINE CORPS

IN the last issue of THE MARINE CORPS GAZETTE (September, 1917) the various expeditions of the Marine Corps, up to January 19, 1915, were set forth in the article "The Marines Have Landed," by Maj. Frank E. Evans, U. S. M. C. The following sets forth the expeditionary activities of the Corps through the expeditions to Haiti and San Domingo, but exclusive of any expedition in the present war.

In order that the citation of the various expeditions should be as near correct as possible, the following modifications in the September issue of the GAZETTE should be noted. On page 214, paragraph "1900, June 19," should read as follows:

"1900, June 18—A battalion of Marines, under the command of Maj. Littleton W. T. Waller, U. S. M. C., landed in China, and was joined by some Russians on June 19, and fought the first engagements in China. Colonel Meade, U. S. M. C., with the balance of the regiment from the Philippines, arrived about July 12. Maj. W. P. Biddle, with a battalion, arrived in China, July 31, 1900, and a battalion under the command of Maj. Randolph Dickins landed in China, August 22, 1900. The Marines joined in the International Expedition which marched to Peking and relieved the besieged legations."

Page 215, under the heading "1906, September 30," in the paragraph relating to the expedition to Cuba, there should be inserted in the paragraph the following:

"Col. Littleton W. T. Waller assumed command of the expeditionary brigade in Cuba, October 1, 1906."

The following are the remaining expeditionary activities of the Marines up to the outbreak of the present war:

On July 31, 1915, 24 officers and 409 enlisted men sailed on U. S. S. *Connecticut* from Philadelphia, Pa., for Haiti, Col. Eli K. Cole commanding, and disembarked at Haiti August 4, 1915.

On August 10, 1915, 41 officers and 797 enlisted men, comprising nucleus of First Provisional Brigade, Col. L. W. T. Waller com-

manding, sailed from Philadelphia, Pa., disembarking at Haiti August 16, 1915.

On August 26, 1915, 13 officers and 418 enlisted men sailed from Philadelphia, Pa., for Haiti, disembarking September 3, 1915.

On April 30, 1916, 3 officers and 84 enlisted men sailed from Haiti for Santo Domingo, disembarking May 5, 1916.

On May 2, 1916, 4 officers and 99 men sailed from Haiti for Santo Domingo, disembarking May 5, 1916.

On May 6, 1916, 1 officer and 49 men sailed from Guantanamo, Cuba, for Santo Domingo, disembarking May 9, 1916.

On May 9, 1916, 5 officers and 199 men sailed from Haiti for Santo Domingo, disembarking May 12, 1916.

On May 18, 1916, 13 officers and 136 men sailed from Haiti for Santo Domingo, disembarking May 22, 1916.

On May 21, 1916, 3 officers and 110 enlisted men sailed from Haiti for Santo Domingo, disembarking May 24, 1916.

The forces in Santo Domingo formed the Second Provisional Brigade, under the command of Col. Joseph H. Pendleton, U. S. M. C.



BOOK REVIEWS

The Marvel Book of American Ships, by Capt. Orton P. Jackson, U. S. N., and Major Frank E. Evans, U. S. M. C., published by Frederick A. Stokes Company, is a book which succinctly and in an interesting way gives information which every American should have.

The book covers a wide range of subjects, including the personnel of the Navy and its matériel. The types of ships, from the yacht to the superdreadnought, are described, as well as their functions in sea battles. Many auxiliary subjects are dealt with, such as deep-sea diving and other subjects not only interesting to the American boy but to the adult.

The same publishers have on the market a book on the "Army and Navy Uniforms and Insignia," by Col. Dion Williams, U. S. M. C. A short study of this book will remove many doubts as to the rank, corps, and service in the military and naval forces of the United States and all other fighting powers. It would seem to be almost indispensable to the soldier or sailor who is to cooperate with the allied forces in the present war.

Frederick A. Stokes Company have also on the market a book entitled "Rapid Training of Recruits," by M. V. Campbell, late lieutenant of the United States Marine Corps, which gives a well-rounded and speedy scheme for the development of the recruit, and in addition gives information for the use of the instructor on such late developments in military work as bombing, trench digging, and the semaphore and other signal systems.

"The Boys' Book of Submarines," by A. Frederick Collins, and published by the same publishers, gives a story on the development of the submarine, its history, and its construction and operation. Both the Lake and the Holland types are discussed, and full directions are given for the construction of a model submarine.

Frederick A. Stokes Company have also published "The Unpopular History of the United States," by Harris Dickson, which sets forth in a forceful way many facts based on official records at Washington relating to past wars, which sets forth in a vivid way the reason for universal military service.

A book on "War French," by Col. De Witt Wilcox, professor of modern languages at West Point, contains much information

useful to both officer and enlisted man who may be called upon to cooperate with our allies in France. Professor Wilcox as a linguist is well known. The text is divided into three main sections—the French language, the French Army, and simple sentences for translation, together with vocabularies.

“Hand Grenades,” by Maj. Graham Ainslie, describes the various English, French, and German grenades now in use, with instructions as to handling of same. Chapters are devoted to the composition and control of grenade squads and methods of attack.

“Machine-Gun Practice and Tactics, for Officers, Noncommissioned Officers and Men,” is a comprehensive study of the nature and function of the machine gun, by a Canadian officer of several years’ experience at the front, and is intended as an assistant to officers and men with this arm in the service.



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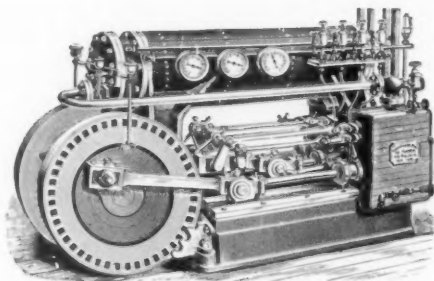
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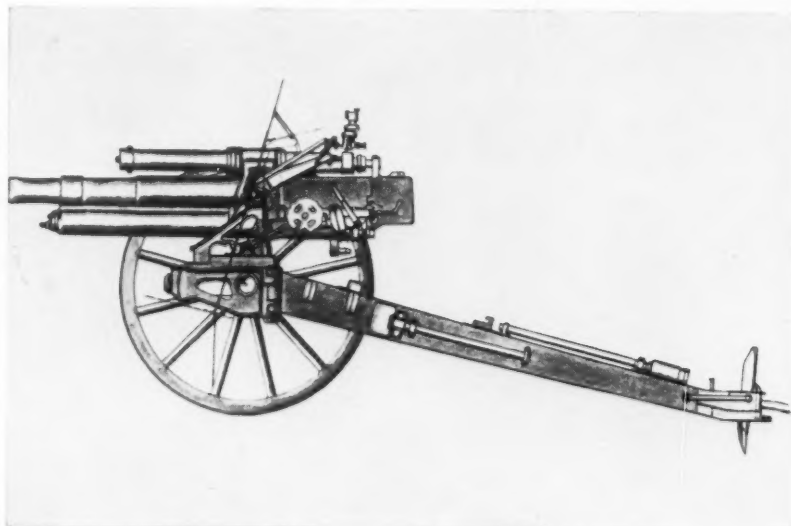
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